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COMPUTING, INFORMATION, AND COMMUNICATIONS (CIC) DIVISION • LOS ALAMOS NATIONAL LABORATORY

As part of the continuing efforts to develop nuclear fusion as an economical energy resource, Los Alamos and other laboratories are contributing to the Numerical Tokamak Project, an attempt to accurately model the physics processes inside a tokamak fusion reactor using computer simulations. As an example of such work, the accompanying image shows poloidal and toroidal cross-sections of the electrostatic potential during a gyrokinetic particle simulation of pressure-gradient-driven turbulence. The shadings indicate the twisted helical structure of the plasma instabilities which develop in response to steep temperature gradients from the extremely hot core to the cooler edge region. This simulation was developed by Dr. W. W. Lee, Dr. Scott E. Parker, Dr. Julian C. Cummings, and Zhihong Lin at the Princeton Plasma Physics Laboratory. It runs on the CM-5 computer at the Advanced Computing Laboratory, typically using a 256x256x128 grid and 8 million particles.

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Consulting

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Lotus Notes: Enhancing Network Communications

While the advent of computer networks has vastly improved our ability to transmit, receive, and manipulate data, it has also created its share of technical problems. For example, how to provide an e-mail system that will operate smoothly and efficiently across multiple computer platforms. This kind of problem is particularly evident in a diverse and evolving computing environment like the one here at Los Alamos.

The Workgroup Technologies Team within the Desktop Support Group (CIC-2) has been working on a project to solve some of these problems by using a commercial software package called Lotus Notes. Lotus Notes is a workgroup computing environment that helps people work together more effectively regardless of their platform, technical, organizational, or geographical boundaries. Notes has the potential to change the way Los Alamos does business by extending communications from the workgroup to the entire Laboratory. Although traditional e-mail systems enhance organizational communications, Notes goes even further by providing database and application development tools, built-in encryption, and electronic signatures.

Project Development

The move toward Lab-wide communications began in 1991 when another workgroup application was installed in the Laboratory Director's Office to manage the flow of business correspondence to and from the office. This application proved to be an excellent workgroup solution. When installed, the application was ahead of other office automation products. However, as time passed and the market expanded and matured, the application's developers lacked the resources to develop it into a product that could accommodate Lab-wide utilization. Consequently, in early 1994 a search was initiated to find a product with the following features:

- Cross client/server platforms,
- Professional or end user development environment,
- Secure communications,
- Capable of integrating with existing SMTP e-mail system,
- Efficient remote connectivity,
- Connectivity to other electronic tools such as text processors and spreadsheets, and
- Imaging and image annotation features that match the director's current application.

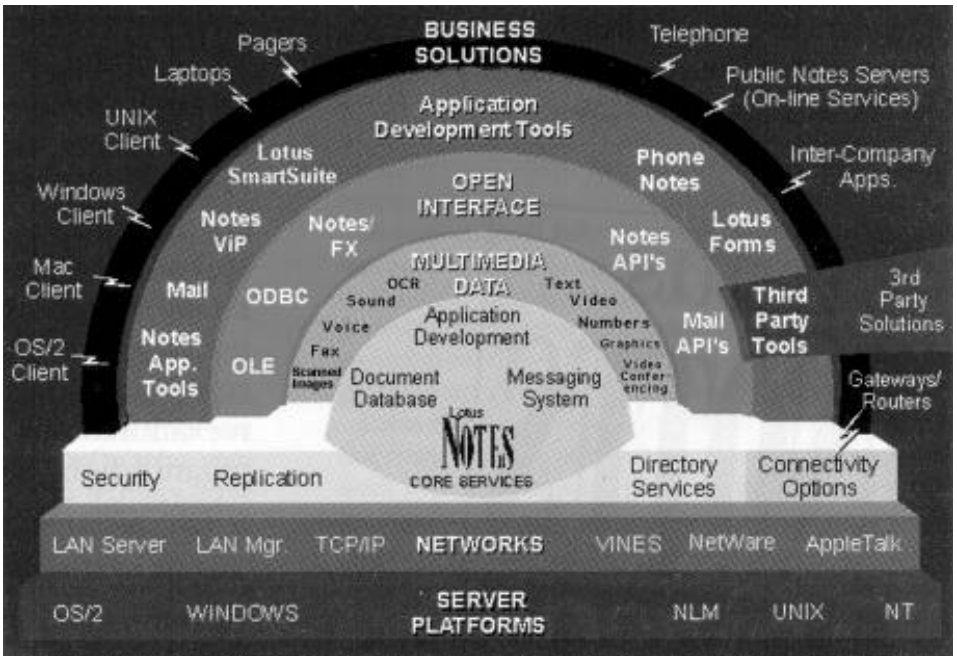
The first feature immediately reduced the field of suppliers down to only a few major players. The remaining features reduced the list down to one—Lotus Notes.

Advantages of Lotus Notes

The figure, Lotus Notes Architecture (see page 2), illustrates the relationship between Notes and the many systems with which it can interface. Below are some specific features of Notes.

- Provides compatibility with most operating systems used at LANL.
  - — Servers for OS/2, UNIX, Novell NLM, and WindowsNT.
  - — Clients for Windows, OS/2, UNIX, and Mac.
- Provides a development environment that is suitable for use by professional developers and knowledgeable end users. (Because of Notes' popularity, a wide range of third party development tools and add-in products are available.)
- Provides secure electronic communications by encrypting data through dual-key RSA Cryptosystem.
- Integrates with LANL's existing e-mail POP servers via a SMTP Gateway.

- Provides remote connectivity, which can be handled in two ways: (1) Because Notes uses Internet Protocol (IP) communications, remote users can access the system with a Serial Line IP (SLIP) connection and (2) Notes can also replicate a database between server and remote workstation. You can use replication to synchronize updates, additions, and deletions between separate copies of the same database on different machines.
- Provides the standard Windows Object Linking and Embedding (OLE) and Dynamic Data Exchange (DDE) facilities for connectivity to other electronic tools. In addition, Notes offers Field Exchange (FX) that provides a field level link to many popular electronic tools.



Lotus Notes Architecture

One weakness of Notes is its limited image management functions. However, because Lotus is a dominant force in the market, Lotus or a third party will probably develop a solution to this problem.

Notes Pilot Platform

The Workgroup Technologies Team was formed in July, 1994. Its mission was to deliver state-of-the-art communication technology that would enhance productivity and improve access to Laboratory knowledge. The Team's initial task was to determine if the Director's workgroup model could be scaled on a Lab-wide basis using Lotus Notes while adhering to the goals of the Los Alamos Information Architecture Initiative.
To accomplish these goals, the Team focused on improving communication at the directorate level by developing and purchasing a suite of applications under Notes which could eventually scale for Lab-wide communications. These Notes applications and functions were initially installed and are being tested using a small pilot group within CIC. These applications include the following:

- E-mail with extended functions such as brainstorming, which allows you to collect ideas from any number of people in one mail message while allowing those same people access to the mail message. Another e-mail option is opinion poll, which allows a group to vote on a given topic and have all responses tallied into one message. Polls can be anonymous, in which case only the final tally is given, or the poll can provide information on how each person voted.
- Integrated fax routing to and from the user's Notes account.
- Discussion databases that allow feedback on any given topic.
- Action tracking with e-mail enabled notifications for all Laboratory directors, allowing them to keep track of all work given out to their organizations (this application was specially designed for LANL).
- Shared memos with encryption capabilities that incorporate the standard LANL letterhead templates and provide for sensitive memos by encrypting the body of the memo.
- Search capabilities that allow access to the Electronic Mail Registration (EMR) database for locating names, addresses, phone numbers, etc. Unlike Finger or Phone, Notes allows you to browse the entire database for more careful analysis. This capability also applies to distribution lists, allowing you to see who is on any given distribution list.
- Imaging with optical character recognition (OCR) and annotation (currently not available but under development).

Support Team and Implementation

During the pilot phase, the Workgroup Technologies Team developed procedures for Notes installation, administration, and training. Other groups within CIC have been involved to create a Notes Support Team that will be in place when this application is installed outside of CIC. The Desktop Support Group (CIC-2) will provide installation assistance and customer phone support. The Customer Service Group (CIC-6) will provide classroom training. The Notes Support Team currently has plans to install Notes in CIC group offices to demonstrate the capabilities of a cross-platform, shared working environment; Notes will then be used to help develop this year's CIC business plan. Additional plans include installing Notes in a limited number of directors' offices and eventually all directors' offices.

Vision and Future Capabilities

The vision and long term goal of the Workgroup Technologies Team is to establish a communications infrastructure for LANL that will provide a consistent interface for e-mail, fax services, and document search capabilities within the workgroup, Laboratory, and the World Wide Web (WWW). Lotus Notes also provides a platform with the potential to develop even more advanced communication tools in the future. These tools could provide the capability to:

- Publish documents on the WWW from any application within Notes,
- Search the WWW from Notes,
- Retrieve voice messages and e-mail from Notes,
- Retrieve e-mail messages from the telephone,
- Direct fax delivery to an e-mail account,
- Integrate paging systems with call management and problem tracking,
- Provide interactive on-line forms that can be routed to a predetermined path, and
- Conduct teleconferencing while modifying real time data.

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UNICOS 8.0: Modifications to Purge Process

UNICOS at release 8.0 is quite a bit different than our other UNICOS systems. This required us to rewrite the purge operation for /tmp and /usr/tmp on machine zeta in the Central Computing Facility (CCF). The rewrite changed the purge process slightly; symbolic links will be purged.

The /usr/tmp purge operation will delete symbolic links based on the following conditions:

(1) The directory has not been modified within 30 days and would be empty except for symbolic links.

(2) These symbolic links have not been accessed within 30 days.

If these two conditions are met, the directory and the symbolic links are deleted together. The same is true for the purge of the /tmp file system, except that the grace period is 2 days rather than 30 days.

The $TMPDIR in batch jobs is protected from the purge operation. However, if you are using symbolic links in unprotected directories (anything outside of $TMPDIR) during a batch run you may need to modify your batch scripts for use on UNICOS 8.0 systems. Please feel free to contact me or the consulting office for information about modifying your batch scripts.

Currently this change only affects machine zeta. Tau, although running UNICOS 8.0, does not purge /tmp and /usr/tmp at this time. There are no scheduled plans to upgrade the other Cray machines to UNICOS 8.0, but we anticipate doing this in late spring or summer of 1995. We are publishing this article now so that you will have a few months warning.

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PVM 3.3 Development Toolbox

PVM (Parallel Virtual Machine) 3.3 is a message passing library installed and supported on the IBM open cluster. PVM 3.3 is also installed in info-server for SunOS 4.1. This article will focus on the development tools currently installed and supported at LANL for message passing parallel programs using PVM 3.3. The platforms currently supported are SunOS, Solaris, and IBM AIX. This support is provided by the Parallel and Distributed Tools Team within the Distributed Computing Group (CIC-8).

In this article, we first discuss some general characteristics of parallel programs that make debugging a parallel program different from debugging a sequential program. Then, we go on to discuss the tools: Xmdb, a dynamic debugging tool; XPVM, a trace based monitoring and performance debugging tool; and PGPVM and AIMS, performance debugging tools. Note that trace based tools inherently limit debugging to one particular execution instance. See Tables 1 and 2 at the end of this article for tabular comparisons of these tools.

What's So Special About Parallel Debugging?

Knowledge of certain characteristics of parallel programs will help parallel programmers to be more prepared when disaster strikes. These characteristics require parallel program debugging tools to adopt significantly different strategies from that of sequential program debugging tools. We will discuss some of these characteristics below. Note that sequential programs do not normally share these characteristics of parallel programs.

Probe Effect: Many parallel programs, especially those that are not yet debugged, display nondeterminism. When a program is nondeterministic, it is possible that given the same input the program may exhibit different behaviors in different executions.

Insertion of a *print* statement in a parallel program can potentially change the behavior of a parallel program if the program is nondeterministic. When you insert a *print* statement in a program to observe the value of a variable, you may be observing the behavior of the program. Thus, inserting a probe in the program can change the behavior of what is being observed.

Xmdb uses a strategy called Controlled Execution to minimize probe effect. AIMS 3.0 uses algorithms to reorder the execution trace in order to reduce probe effect.

Unrepeatability: Nondeterminism also causes unrepeatability, i.e., difficulty in reproducing the behavior of a parallel program. Execution replay is a technique used to reproduce the execution of a parallel program. In execution replay, a program is re-executed using an execution trace. The execution trace is used to trigger and veer the re-execution of the program to match the original execution. Xmdb provides an execution replay mechanism.

Race Conditions: Race Conditions are manifested by nondeterministic programs. Race conditions occur when the behavior of a program depends on the order in which messages are received in a process. Sometimes, race conditions are introduced deliberately, i.e., to create the global sum of values sent from other processes; the order of receipt of messages is immaterial. However, the unintentional race conditions need to be specified first and then detected. Xmdb provides facilities to support these requirements.

Multiple Threads of Control: Parallel programs that execute in workstation clusters have as many threads of control as the number of processes. Even while employing a SPMD (Single Program Multiple Data) approach, in which the multiple processes share the same program source code, not all processes may be executing the same segment of code at the same time. Thus, a programmer is practically reduced to simultaneously remembering the information related to all the threads of execution. Xmdb allows the programmer to concentrate on one thread and debug the other threads with respect to this thread. AIMS 3.0, XPVM, and PGPVM provide space-time diagrams in which each thread of execution is represented by a line.

Data Communication: Performance of a parallel program is much dependent on whether the data required for the computation is available at various points in the execution of a program. Thus, debugging performance bottlenecks involves determining the places where the program has remained idle due to non-availability of data. The non-availability of data could be either due to delays in producing the data at the data producing process or due to communication delays. Furthermore, knowledge of communication loads at different instants of time can be helpful in identifying potential performance bottlenecks in data communication. XPVM provides diagrams that will help the user to detect the communication bottlenecks. AIMS provides mapping from source code to execution events in addition to diagrams similar to XPVM.

Distributed Computation: In a parallel environment, the computation is distributed over many processors. In this situation, the utilization of processors can point out imbalance in the distribution of computational load. XPVM provides processor utilization diagrams to help the user to detect computational bottlenecks. AIMS provides processor utilization diagrams and profiles the time spent in traced functions. This is similar to the *prof* and *gprof* utilities in UNIX.

Xmdb

Xmdb has twin purposes: to serve as a parallel programming and debugging trainer for beginners and to provide sophisticated debugging support for experienced programmers in the beginning phases of algorithm development. Xmdb was partially developed at LANL. The main features of Xmdb are as follows:

- debugs parallel programs (C and Fortran) written in PVM 3.3,
- displays messages and message contents,
- stop conditions based on message type or other conditions based on messages,
- controls the execution of a program by message queue management,
- integrated symbolic debugging with node level debuggers (such as dbxtool and gdb),
- automatic race detection and the capability to specify harmless races, and
- run-time help to aid novices.

Prior to running a program under Xmdb, one may run a message preprocessor (mpp) on the program source files if message contents need to be displayed or used by Xmdb. In the Xmdb environment a program is debugged with respect to a single process (called the controlled process) in the program. Such an execution technique is used to simplify debugging of a program. Symbolic debugging can be done on any of the processes using any sequential debugger that is available in a particular machine by clicking on a button. The debugger to be used can be specified to Xmdb. A replay mechanism is provided to capture bugs that occurred in a previous execution. Race condition detection is enabled by default. However, race conditions that are harmless can be specified to Xmdb so that such race conditions are not reported. More information on Xmdb can be found in the Web page; the URL is:

http://www-c8.lanl.gov/dist_comp2/mdb/mdb.html

Pragmatic Aspects: Xmdb is installed in /usr/lanl/xmdb. Currently Xmdb is available for SunOS, Solaris, and AIX. Instead of linking with *libpvm3.a* and *libgpvm3.a* libraries distributed with the PVM 3.x distribution from Oak Ridge National Laboratory, the PVM programs should be linked with a Xmdb library called *libmdb.a.* Xmdb has an independent implementation of PVM 3.3 and therefore does not require PVM to be installed in the system.

Current Limitations: The current version of Xmdb implements multiple processes in the same processor. This imposes certain restrictions on the total number of processes that may be in a program and on the resources of these processors. We have recently initiated a Heterogeneous Distributed Debugger (hdd) project that will incorporate the message debugging features of Xmdb in a truly distributed fashion.

XPVM

XPVM is a graphical console and monitor for user code based on PVM 3.3.1 and above. This tool is mainly useful in identifying performance bottlenecks in programs, in addition to serving as a monitor for PVM programs. The main features of XPVM are listed below:

- space-time diagram,
- utilization bar graph,
- call trace of PVM system calls, and
- graphical interface to PVM console.

Pragmatic Aspects: XPVM is installed with PVM in /usr/lanl/pvm. Currently, XPVM is available for SunOS, Solaris, AIX, HPUX, IRIX, in addition to several other platforms. The attractiveness of XPVM is that it is closely integrated with the PVM 3.3 environment. A process has to make the call *joinxpvm()* to enable tracing of that process. This function is available in a file called *joinxpvm*.c; this file needs to be compiled and linked to the source code.

Current Limitations: There is no mapping of run-time events to source code. When there are many processes and many messages, such mapping would help the user to identify program bugs easily. Also, the current method of preparing a program to work with XPVM is somewhat cumbersome. However, we hope to have this limitation removed in the near future.

PGPVM

PGPVM was developed at Emory University. Conceptually, PGPVM is similar to XPVM in that both use execution traces to generate pictures that are useful. PGPVM provides a run-time library that produces traces that can be used by ParaGraph, a well known program execution visualizer from Oak Ridge National Laboratory and the University of Illinois at Urbana-Champaign. PGPVM is different from XPVM in its implementation.

Pragmatic Aspects: PGPVM is installed along with PVM libraries. In addition, /usr/lanl/pgpvm contains the documentation for pgpvm. Currently, using PGPVM on C programs requires only the insertion of a call to PGPVM to start tracing a process, apart from adding an additional header file. However, that is not the case for Fortran. The user has to manually change some of the PVM Fortran calls to make PGPVM work with Fortran programs.

Current Limitations: PGPVM suffers from scalability, just like XPVM, since it does not have any mapping mechanism to map run-time events to source statements. The need to use a different library and the need to change source statements make PGPVM less attractive than XPVM. However, the attractiveness of PGPVM is that the trace that it produces can be used with ParaGraph which is a reliable and useful visualization tool.

AIMS 3.0

The Automated Instrumentation and Monitoring System (AIMS) has been under development for the past few years at NASA Ames Research Center under the sponsorship of the High Performance Computing and Communication Program. It is a software tool kit that facilitates performance evaluation of parallel applications on multiprocessors.

AIMS 3.0's instrumentor uses the Sage/Sigma tool kit developed at Indiana University. This enables AIMS to instrument C and Fortran 77 programs automatically and will allow AIMS to handle HPF (High Performance Fortran) programs in the future. AIMS 3.0 also monitors I/O operations such as file system read/write times. A System Configuration (or SysConfig) View has been incorporated into VK (see description below) to display the underlying topology of the workstation network. The AIMS tool kit contains the following components:

• xinstrument: a source-code instrumentor which supports Fortran 77 and C message-passing programs written with PVM 3.3,

• a monitor library of timestamping and trace-collection routines that runs on networks of workstations,

• pc: a utility for removing monitoring overheads and their effects from the communication pattern recorded in the trace file,

• VK: a trace-animation facility that supports simultaneous visualization of computation and communication patterns as well as analysis of data movements,

• tally: a profiling facility that associates statistical performance data with various syntactic components of a parallel program, and

• SysConfig: a program that automatically discovers network connection topology for the parallel virtual machine.

Together, these components allow users to instrument, measure, and display their programs' performance. More information about AIMS can be found on the AIMS Home Page on the Web page; the URL is:

http://fi-www.arc.nasa.gov/fic/parallel/aims.html

Pragmatic Aspects: Currently AIMS is installed in /usr/lanl/aims for SunOS. The README file in this directory further instructs you on how to use it. Though at the moment AIMS is available only on SunOS, we are working on making it available on AIX and IRIX platforms.

AIMS automatically instruments the user code. The instrumented code is kept in a different directory than the original code. The instrumented code is compiled with AIMS library and PVM libraries. The executable is then run under PVM, producing the trace.

Current Limitations: AIMS gives additional facilities than XPVM with respect to performance debugging. AIMS is a postmortem tool, in contrast to XPVM which works at runtime as well as postmortem. The postmortem characteristic of AIMS causes scalability problems for large programs as the trace may be huge. Sometimes, storage space may not be sufficient for such large trace data. Currently, work is being done to compress the trace data. Also, at present pvm_psend and pvm_precv are not instrumented in AIMS 3.0.

More PVM....

Summary

First of all, we want our tools to be easy to use. Ideally, we want our tools to be portable across Networks of Workstations and MPPs (Massively Parallel Processors). We also want our tools to be capable of debugging large programs. When the number of processes become large, we want our tools to still be useful. The tools we have currently may not fit our notion of ideal tools. Each of them has its own advantages and drawbacks. As time passes, and with more user feedback, we hope to create a more ideal tool box. For further information on these and other development tools, please read our Web page; the URL is:

http://www-c8.lanl.gov/dist_comp2/devel_tools.html

Please feel free to e-mail any questions or comments on this article to the author.

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Table 1. Pragmatic aspects of tool environment

Feature	Dynamic	Trace Based		
	Xmdb	XPVM	AIMS 3.0	PGPVM
Makefile Change	Yes	Yes	Yes	Yes
Source Code Change[a]	No	Yes	No	Yes[b]
Allocate Library[c]	Yes	No	No	Yes
Additional Code[d]	No	Yes	No	Yes
Coupling with PVM sys	Low	High	High	High

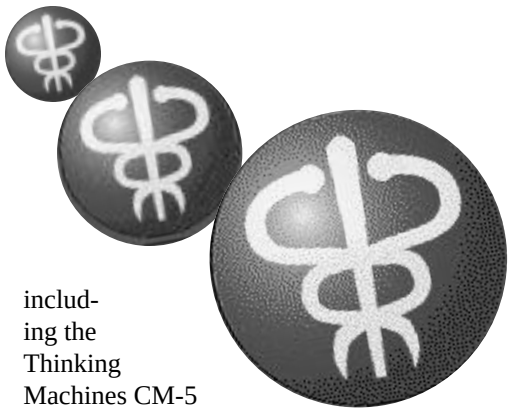
[a] Does user have to change source code?
[b] Must Re-Instrument
[c] Does user have to link with a different PVM library?
[d] Does user have to make special calls in the code to work with the tool?
[e] High: Requires PVM source to be recompiled. Low: Does not

Table 2. Capabilities

Feature	Dynamic	Trace Based		
	Xmdb	XPVM	AIMS 3.0	PGPVM
Visual Interface	Athena	TCL/TK	Motif	Athena[a]
Function Instrumentation[b]	N/A	No	Yes	No
Probe Effect	No	Yes	Compensates	Yes
Instant Replay	Yes	No	No	No
Race Detection	Yes	No	No	No
Execution-Source Mapping[c]	Yes	No	Yes	No

[a] The visual interface is for ParaGraph.
[b] Can individual user functions be instrumented and traced?
[c] Mapping of run-time event to the corresponding source code.

TeleMed: Better Medicine through Sunrise Technologies



Sunrise is a Los Alamos National Laboratory (LANL) project started in October 1993. It is intended to be a prototype National Information Infrastructure (NII) development project. A main focus of Sunrise is to tie together enabling technologies (networking, object-oriented distributed computing, graphical interfaces, security, multimedia technologies, and data-mining technologies) with several specific applications. A diverse suite of application areas were chosen to ensure that the solutions developed in the project are as generic as possible. The most well-developed application in the Sunrise suite is a medical application called TeleMed. TeleMed grew out of a relationship with physicians at the National Jewish Center for Immunology and Respiratory Medicine (NJC) in Denver, Colorado. These physicians are experts in pulmonary diseases and radiology, helping patients combat the effects of tuberculosis and other lung diseases throughout the Nation. These individuals are an expensive and scarce resource, who often travel around the country to share their expertise with other physicians.

To make the knowledge and experience at the National Jewish Center available to a wider audience, Los Alamos National Laboratory is developing a telemedicine system called TeleMed which is based on a national radiographic repository located at Los Alamos. Without leaving their offices, participating doctors can view radiographic data via a sophisticated multimedia interface. For example, a doctor can match a patient's radiographic information with the data in the repository, review treatment history and success, and then determine the best treatment. Furthermore, the features of TeleMed that make it attractive to clinicians and diagnosticians make it valuable for teaching and presentation as well. Thus, a resident can use TeleMed for self-training in diagnostic techniques and a physician can use it to explain to a patient the course of his or her illness.

LANL's expertise in the areas of high-performance computing, advanced networking, image processing, and multimedia information systems has proved to be an important asset for TeleMed. These technologies come into play in the following ways:

- Image Processing—As databases are developed to store large volumes of information, new methods for mining huge amounts of data will become increasingly important. Tools will be needed for analyzing text, imagery, 1-D signals, and other numerical information (LDL & HDL cholesterol counts, blood pressure, body temperature, etc.). One such key tool that is being used in the TeleMed project is automated data analysis of radiographic images. This tool provides the physician with an agent that browses radiographic data and calls the physician's attention to suspect areas. One typical agent can analyze CT images from patients with lymphangioleiomyomatosis (LAM) disease. Pulmonary CT studies reveal that the primary signature of LAM is the presence of many cysts throughout the lung. Members of the Sunrise team have created algorithms that automatically locate the cysts in the pulmonary CT data and record their size. One can compute a histogram of the cyst sizes, which is called a cystogram. The cystogram provides a meaningful quantitative measure of the progress of the disease.
- High-Performance Computing—Especially important to the TeleMed project is the fact that LANL houses massively parallel computing systems, including the Thinking Machines CM-5 and the Cray T3D. Since medical image analysis techniques (such as the LAM agent described above) can be computationally intensive, Sunrise acts as a server of massively parallel computing cycles to physicians in the TeleMed network. Access to such a compute server allows physicians to do near real-time consultation with image analysis agents.
- Advanced Networking—Over the last few years LANL has made numerous contributions to high performance networking technology. The importance of this technology to the TeleMed project is clear since multi-megabyte radiographic data files must be transferred rapidly to the diagnostician. Moreover, Sunrise is aggressively exploring the role of Asynchronous Transfer Mode (ATM) communications technology for use both in image data transfer and desktop video telecollaboration.
- Multimedia Information Systems—The July 1994 issue of R&D magazine features, as a cover story, LANL-developed MediaView, a comprehensive multimedia document authoring and management system. MediaView represents the advanced multimedia expertise Los Alamos is applying to the TeleMed project. Through MediaView, the concept of a document-centric user interface was independently developed. This type of interface is used in the TeleMed pro-

ject and affords users access to a complete range of media-rich components. Physicians can, for example, affix digital Post-it notes to a patient record or x-ray. Voice annotations can be dictated and directly attached to a patient document. Also, a physician can digitally sketch on an x-ray, pointing out important features to a collaborator or patient.

Some of the capabilities of TeleMed can be illustrated by looking at a series of user interface components that are available to the user. The user begins a TeleMed session by selecting a database site from the interface shown in Figure 1. This sets in motion an Orbix-based transaction for vending all patient record objects from the selected site to the requesting client, shown listed in Figure 1 as Patient #1, Patient #2, etc.

To understand the coordination of distributed object activities with user interface activities we can consult Figure 2, a graphical representation of TeleMed objects. In this diagram the arrows represent an inheritance relationship and the other lines represent a reference or containment. Textual data from the PatientInfo object, i.e., the patient's name, was retrieved and used to populate the Patient list in Figure 1.

A patient's treatment record appears by double-clicking on the patient's name in the interface in Figure 1. The user interface manifestation of the DrugRecord object in Figure 2 is called a Graphical Patient Record (GPR) and is shown in Figure 3.

The GPR is an excellent example of Sunrise/TeleMed media-rich document and distributed object technology. The GPR is a virtual document, a patient record that is empty until it is dynamically populated by requests for distributed objects. The DrugRecord object in Figure 2 contains the information necessary for "harvesting" this data from all appropriate sites. Thus, laboratory

Figure 1. Initial* TeleMed *Interface

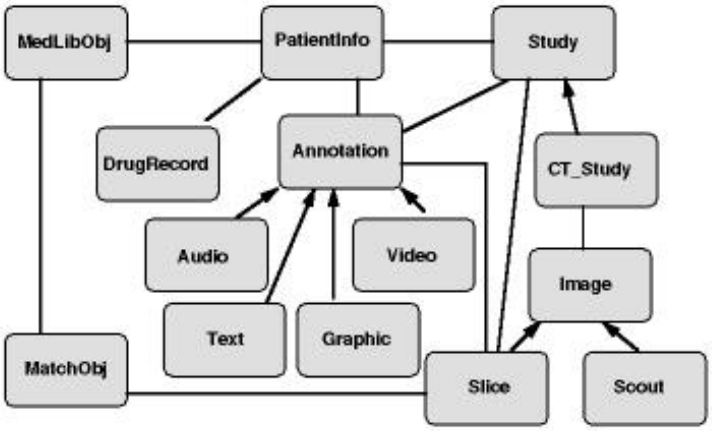


Figure 2.* TeleMed *Objects

reports may be retrieved from the National Institutes of Health near Washington, DC while radiographic data may reside at the NJC in Denver. So, for example, when all patient data are retrieved, icons representing laboratory tests, radiographic studies, drug treatments, etc., are drawn on the GPR template. Each of these icons is mouse-sensitive and, when clicked, call up additional user interfaces and related data.

Before looking at these interfaces it will be helpful to know more about what goes on at the distributed objects level. In Figure 4 we show the relationships between the client process (TeleMed GUI) and the two controlling objects, MedLibObj and MatchObj. Any of these three entities can reside at any location. In fact, the TeleMed GUI can communicate with any number of MedLibObj objects, which, in turn, can call upon the services of any number of MatchObj objects. Suppose, now, the user clicks on a CT study icon in the GPR in Figure 3. This causes a request to be sent to the current MedLibObj to retrieve that

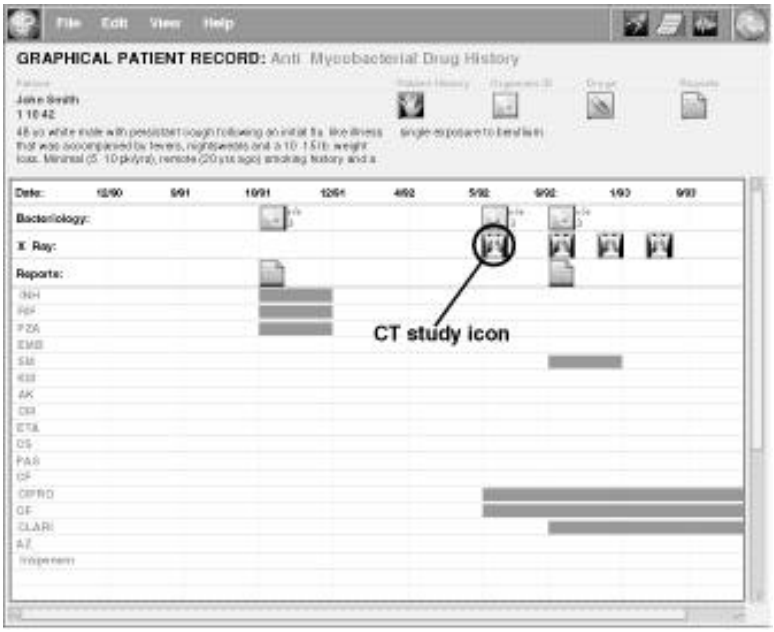


Figure 3. **TeleMed** ***Graphical Patient Record***

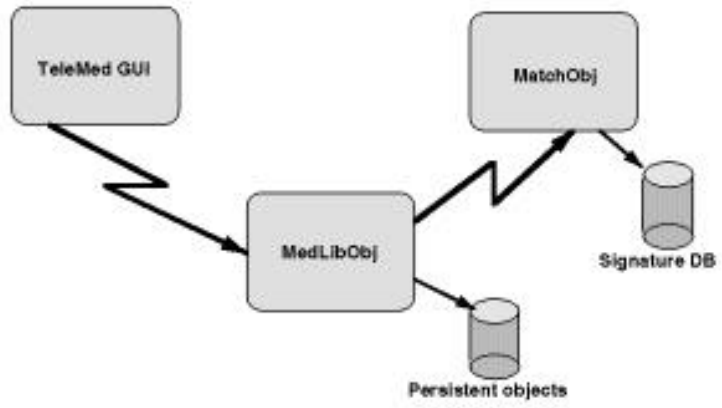


Figure 4. **TeleMed** ***Object Distribution***

patient's CT study from the corresponding persistent object store. That transaction causes the user interface shown in Figure 5 to appear.

The image on the left of Figure 5 is a scout, so named because it was originally used by the CT technician as a guide in determining where to produce full transverse slice images of the patient. In this interface the scout is similarly used, but now as a guide for the physician in selecting slices to view from the database. To do this, the horizontal cursor is dragged up or down to the desired location and released. Here, slice number 23 was selected and is shown on the right.

We conclude our discussion of the TeleMed application by describing one of its most powerful features. This feature allows a user to perform a "query by example" search of an image database. Many of the Sunrise enabling technologies are represented in this feature: massively parallel computation servers, image analysis agents, and distributed object computing. To be specific, the MatchObj object shown in Figure 4 encapsulates the image analysis agent as a member function. For best performance MatchObj will typically reside on a massively parallel computer because the matching algorithm is inherently parallel. The signature database, which contains representative features of each image, usually resides on the same machine as MatchObj. Finally, the user invokes this entire matching operation simply by clicking the "Find Match" button in the upper right of Figure 5. The selected slice is used as the query image. The result of a matching operation is shown in Figure 6.

In Figure 6 the upper left image is the same one the user specified as the example query image. The result of the match is summarized by the thumbnails in the lower scrolling window. Clicking in a selected thumbnail causes its full-size representation to appear in the upper right comparative inspection window.

TeleMed has recently been deployed via DS1 service between Los Alamos and the National Jewish Center. At this point, physicians at National Jewish Center are learning the user interface and reacting to its design and shortfalls. As the TeleMed system reaches a productive state, other sites will be added to the TeleMed network. These will all be sites that are treating and doing research on multi-drug resistant tuberculosis (MDR-TB). Those intending to join are the National Institutes of Health in Bethesda, MD; the Center for Disease Control in Atlanta, GA; the Bureau of Tuberculosis Control in New York, NY; and the Department of Health Services in Los Angeles, CA. With these sites in place, physicians will truly be able to telecollaborate on MDR-TB cases, using the Los Alamos radiographic repository as a common point of contact.

Other Sunrise applications include:

- Materials Modeling—Tools are being developed to rapidly analyze material properties obtained from simulations and instruments such as a tunneling electron microscope. Accomplishments include the development of techniques to correctly identify fractures in materials, even in the presence of poor quality data.
- K-12 Education—Virtual laboratories have been developed to demonstrate multimedia databases in a real world context. This application currently uses the Internet to deliver real-time digital video and synchronized sound to high schools in New Mexico and Hawaii.
- Electronic Documents—HyperTeX software is being used for automatically creating hypertext documents from existing TeX and LaTeX documents. Software has been developed to convert these hypertext documents to Adobe's PDF format. Eventually, WWW URLs will be incorporated as well.

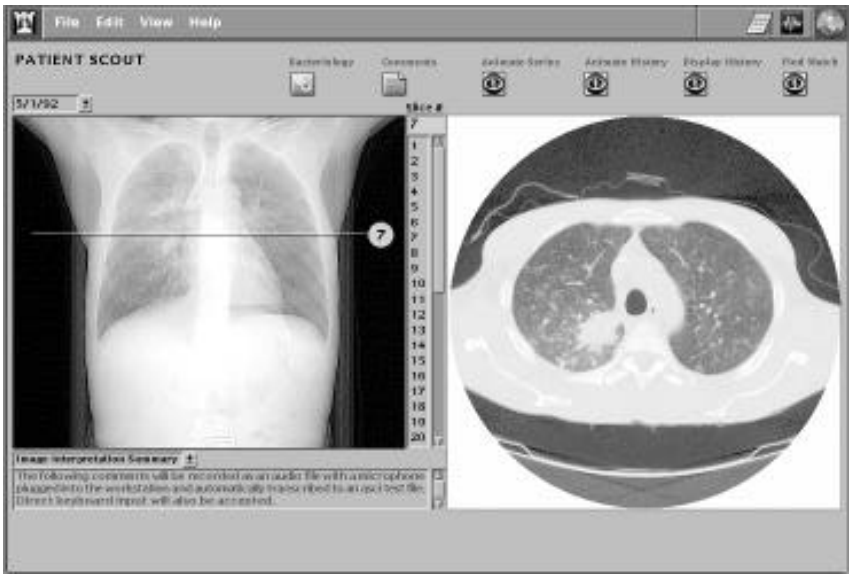


Figure 5. **TeleMed** ***CT Study Interface***

Figure 6. **TeleMed** ***Image Matching Interface***

To Learn More

The Sunrise project is discussed, with associated graphics, in a Mosaic server located at Los Alamos. The URL for Sunrise is

http://www.acl.lanl.gov/sunrise

The URL for the TeleMed application is

http://www.acl.lanl.gov/sunrise/Medical/telemed.html

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Information Architecture Targets Infrastructure Services

When people talk about client/server applications, you'll frequently hear much discussion about which client platform(s) to support, which DBMS (database management system) to use for the server, and issues like functionality vs. interoperability. If the conversation turns to the Internet/WorldWide Web, you're likely to hear a lot about Mosaic vs. Netscape, HTML II vs. HTML Plus, the White House home page, and other such topics. For information sharing, the conversation might address which desktop applications to use, how to educate people about available information, who has legitimate reason to access which information, etc.

Throughout these discussions, however, one question frequently overlooked is "What about the connection?" After all, even the best client/server application is only as good as the connection between the client and server, even the best Internet browser is no faster than the connection, and information sharing without the connection is no more effective than interoffice mail.

In recognition of this, one of the three main recommendations from Phase I of the Information Architecture (IA) project was that "The Laboratory Leadership Council endorse an institutional information infrastructure." When the LLC unanimously approved this recommendation in May 1994, the stage was set for the formation of the IA Infrastructure Team.

As the basic connecting link among the various components of the IA, the infrastructure's relationship to the data, desktop, applications, and data warehouse components can be modeled as shown in Figure 1.

For further discussion concerning roles of the Data, Desktop, Applications, and Data Warehouse IA Teams, see the November 1994 issue of BITS.

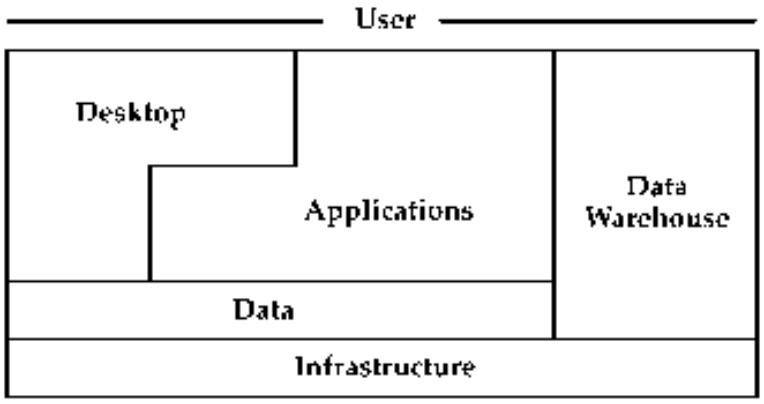

Figure 1. **Basic relationship of IA teams**

More than Just a Wire

As the Infrastructure Team began its work, it soon learned that "connection" means a good deal more than just "wire." As shown in the following table, the scope of the infrastructure also includes protocols and security, and it leads quickly into areas such as services and training.

As further explained below, many of the specific subject areas overlap with work already being done by others. The table shows that the subject areas reach into network management procedures and tools, which in turn extend the infrastructure all the way to the user's desktop. A revised model of the teams' relationships is shown in Figure 2.

General Areas	Specific Subjects
Foundations for Connectivity	LANLnet Topology Network Management Network Protocols
Basic Services	Newsgroups Automated Backups and Recovery E-mail Internet/WorldWide Web
Database Access	On-line Documents Distributed File Systems Naming Services
Security	Security Architecture Encryption, Authorization, Authentication Security Testing
Training	User Education Awareness Training

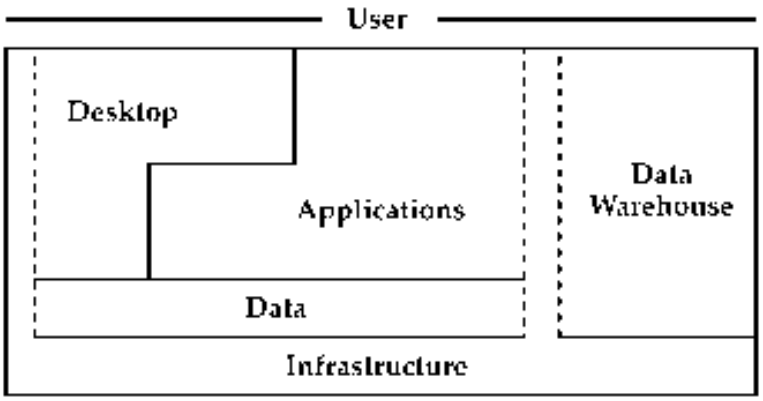

Figure 2. Revised Relationship of IA Teams

In this revised model, the dotted lines emphasize the overlap between the infrastructure and other teams—areas of shared interest where the various teams must actively collaborate. Indeed, collaboration is a common theme for the infrastructure team, both within and outside the IA project itself.

As Allen Mathews (DX-13), team leader for the IA Infrastructure Team, says, "Fortunately, many of the topics we are concerned with are already being addressed by Laboratory-sponsored projects," such as LANLnet, the CIC-2 Hypermedia Team, and the Computer Security Working Group.

"In these instances," Mathews continues, "our goal is to leverage off work already being done by others and help to make the result consistent with the rest of the IA."

Selected Subject Areas

To handle the breadth of the scope, the Infrastructure Team is chartering separate teams to address each of the specific subject areas. Focusing on just a few of these areas can demonstrate how the team coordinates its work with others and how the results will impact the Laboratory community.

Network Management: A primary objective of the team is to develop, in conjunction with Laboratory network managers, a consistent set of guidelines for network management. The fundamental purpose here is to iron out inconsistencies that become barriers to providing fundamental services, implementing distributed processing, and navigating through the various areas of the Laboratory's communications infrastructure, regardless of underlying protocols or network software (e.g., users shouldn't have to care whether a network is running Novell or AppleTalk).

Encryption, Authorization, & Authentication: Currently, too many applications are unable to move forward because of cumbersome security requirements. Private industry, faced with the pressure to bring commerce to the Internet, is rapidly advancing in its techniques for protecting bank accounts, credit card numbers, and similar sensitive information. By exploiting these techniques, the IA hopes to move security to the data level, open up applications to wider use, enable more effective sharing of information, and foster the trend toward a unified underlying infrastructure (as opposed to the current need to split the open/administrative and secure networks).

Automated Backups and Recovery: The information on your local hard disk is a Laboratory asset. Laboratory resources have been expended to create and maintain that information, and it is in everyone's interest that that information be protected from loss. One service that can not only achieve this but also ease your system administration work load is automated backups—just leave your machine on at night and the infrastructure will reach out and backup your disk to a central location. Then, if your machine fails (or you accidentally "rm-r" in the wrong directory) you can easily recover the lost information. The IA role in developing this capability is to develop the guidelines for when and how it can be effectively and responsibly implemented.

Internet/WorldWide Web: There is a revolution underway in our methods of accessing and using information. While the government might talk of the National Information Infrastructure (the superhighway we look forward to) and the United Nations might talk about the promise of its Open Systems Interconnection (the X. protocols), universities and private industry have continued to push ahead with the development of the Internet. A series of robust, well-tested protocols is already out there, and the server/browser technologies are rapidly evolving (if your browser is more than three months old, it's probably ready for an upgrade). Along with the availability of these tools comes a wide range of problems such as

IA Infrastructure Team Mission Statement

Mission: Lead the Laboratory in defining, developing, and promoting guidelines, standards, and procedures for the information infrastructure at Los Alamos.

Definition: The information infrastructure comprises the connection, equipment, software, services, security, protocols, management, and consistent support that provide and maintain the connections among Laboratory citizens' and external stakeholders' desktops, central computers, and other information resources, both local and remote.

how to maintain links to legacy methods (Gopher) while exploiting the potential of new tools (Mosaic, Netscape, etc.); how to present information in a radically new format (it doesn't look like a page, read like a page, or work like a page); how to find what you're looking for and make it easy for others to find what you've put out there; and what is responsible use.

Awareness Training: Many of the information resources that are already available are under used. This phenomenon is likely to get even more pronounced in the future as the rate of innovation continues to increase. The fundamental goal here is partially to let people know what is available but even more importantly to develop the flexible mechanisms that can adapt easily and gracefully to future needs.

The subject areas listed above are but a portion of what the IA Infrastructure Team has targeted, but they should illustrate the pervasive impact that infrastructure guidelines and standards will have on the Laboratory community.

Participation is Welcome

A cornerstone of the IA project as a whole is its emphasis on consensus building among as wide a sample of the Laboratory community as possible. Although the IA project has been empowered by the LLC to develop guidelines and standards, it is the active involvement of Laboratory citizens—scientific, engineering, and administrative alike—that ensures the deliverables will meet the real world needs of those citizens. Hence, the project welcomes participation in a number of ways:

• Anyone who wants to is welcome to join an IA team; in the history of the project, no one has ever been turned away.

• Groups are continually forming to address specific subject areas, and you are welcome to work on any subject areas that interest you. (See sidebar for details on how to find information.)

• If you don't have time to actively serve on a team, you can still follow the team's progress by subscribing to its e-mail distribution list.

• The project periodically holds forums to discuss its progress with anyone who chooses to attend; these forums are especially valuable to the project because they tend to reveal new perspectives.

• Before an idea becomes a guideline, the IA project issues requests for comment (RFC); anyone can respond to these requests, and all responses will be taken seriously.

• Before the idea, along with input from its RFCs, can evolve into a standard, it is issued as a guideline that Laboratory citizens are encouraged but not required to adhere to; this is a test period, and any input about the effects of the guideline, good or bad, is welcome.

As Mathews says, "We have set an ambitious schedule. Anyone at the Laboratory who is interested in helping us on these topics is welcome to join our team."

To join the IA Infrastructure Team, contact Allen Mathews (DX-13, 7-9055, arm@lanl.gov). For instructions on joining other IA teams, see the November 1994 issue of BITS or look beneath the IA on-line home page under "Information Architecture Teams" (see accompanying box for instructions on reaching the IA Gopher/Mosaic home page).

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Communications Arts and Services (CIC-1)

How to Track IA Progress

To follow the project's progress on the LANL Gopher/Mosaic server, look under "Computing at LANL/Information Architecture Project." The URL is

http://www.lanl.gov:8000/info-arch

The IA project currently maintains the following open e-mail distribution lists for its teams:

• Applications Team: ia-app@lanl.gov
• Data Team: ia-data@lanl.gov
• Data Warehouse Team: ia-dataw@lanl.gov
• Desktop Team: ia-desk@lanl.gov
• Infrastructure Team: ia-inf@lanl.gov

Additional lists form and dissolve as work progresses on specific areas. For an up-to-date listing, look beneath the IA home page under "Introduction to Information Architecture Project."

To follow or join newsgroup discussions of RFCs and proposed guidelines and standards, look on the LANL Gopher/Mosaic server under "Network News (USENET)/LANL Specific Newsgroups/info-arch." The URL is

gopher://infoserver.lanl.gov:4320/1nntp%20ls%20lanl.info-arch%20

Related non-IA e-mail distribution lists of interest include:

• Internet Information Systems User Group: iisug@lanl.gov
• WorldWide Web User Group: wwwug@lanl.gov
• LANLnet Distribution List: lanlnet@lanl.gov

Entering Contractors and External Customers in the Employee Information System

There are different scenarios for entering or updating information about contractors or external customers into the Employee Information System (EIS). Actually, these initial entries and updates are entered into the Directory Information System (DIS), which is on the main menu in the EIS. Below are four of the most likely scenarios you might encounter during this entry process.

1. Contractors working for Contract Personnel Services (CPS)

Contractors who work for CPS contract companies are initially entered into DIS within EIS by the CPS Office; for secretarial contractors call 667-7929 and for technical contractors call 667-2299. However, CPS enters and maintains screen one only; for non-lab people there are three screens total. Screen one (update non-lab or UNL) contains full name, organization code, cost center, Z#, birth date, social security #, company, start date, termination date, and employee type information. Information such as mail stop and phone number are listed on screen two (update directory information or UDI). Screen three (update address information or UAR) contains home and mail address information. Two options are available for completing screens two and three. If the contractors have an ICN password, they can enter the information themselves; if the contractors do not have an ICN password, the group for which they work can enter and update the information.

The CPS Contract Companies are:

- B. I. Literary Services
- Butler Services
- Comprehensive Computer Consulting
- Consultants in Data Processing
- EWing Technical
- General Physics
- Johnson Engineering Corp.
- Professional Writing Services
- Ray Rashkin Associates Inc.
- Technical Communications Services
- Technadyne Engineering Consulting
- VOLT

2. External contractors not associated with the CPS contract Companies

These contractors need to be entered into DIS within EIS by the group for which they work. The group secretary or administrative assistant will need to enter all three screens.

3. External ICN Users

These users are entered into DIS within EIS by External Customer Support (505-665-1517).

4. Laboratory Visitors

Visitors are entered by the group they are visiting.

All four of these scenarios do not apply to Laboratory employees. A Personnel Action (PA) Form must be processed before a Laboratory employee can be entered into DIS within EIS.

If you have any questions please call Lab-wide Systems at 7-9444 ext. 2.

Vicki Brown, brown_vicki_l@lanl.gov, 505-665-3788, CIC-6 Training Office

Basics of E-mail Attachments

Electronic mail has gained tremendous popularity here at the Laboratory in recent years. Many people have discovered the power and convenience of attaching files to e-mail messages. E-mail attachments allow people to easily share files in moments over any distance. It has replaced more cumbersome methods such as exchanging diskettes by postal mail or transferring files with modems and difficult, obscure terminal programs. Graphics, spread sheets, and documents may be sent across different platforms and across the globe more easily than ever before, but there are still ways to go wrong.

E-mail travels through a pipe seven bits wide in ASCII format. ASCII is a text only computer language. Most of the files you send will be in eight bit format. Why the difference? Who knows! If it were easy, everyone would do it and we here in tech support would be out roaming the streets like wild dogs. How do you stuff a file in eight bit format down a seven bit pipe? Answer—You encode it and here is where things get sticky. There are three main encoding schemes: uuencode, binhex, and mime. When you attach a file to an e-mail message, the encoding scheme in your mail program converts the file to seven bit format. When your e-mail arrives at its destination, the mail package on the other end of the wire has to convert your attachment back into eight bit format. If your mail package is using uuencode, and you send something to someone whose mail only talks mime, the attachment will not get converted back into eight bit format. The recipient will see only garbage (see Figure 1) stuck to the end of your e-mail message instead of the wonderful spreadsheet you spent days on, which was due there an hour ago!

What do you do? Right now, the only thing you can do is call the recipient of your mail and hope that person knows as much about encoding as you do. The chart in Figure 2 lists some popular mail systems and the encoding schemes they understand. If you know what mail package the recipient uses, you may be able to set your mail package to send something that person can decode (see Figure 3). If you are trying to mail an attachment to someone whose mail simply cannot handle any encoding scheme you can generate, the recipient may be able to get a standalone package to decode the file from the mail text. At this point though, you are out on the ragged edge.

```
>—====================_793998479==_
>Content-Type: application/octet-
stream; name="SLIPPR15.ZIP"; x-mac-
type="42494E41";
x-mac-creator="6D646F73"
>Content-Transfer-Encoding: x-uuen-
code
>Content-Disposition: attachment;
filename="SLIPPR15.ZIP"

>begin 600 SLIPPR15.ZIP
>M4$L#!!0````(`&)I+QR*;=I7X!4``(`A```+
````x4TQ)4%!%4BY%6$6E60M< M5-
>9_^YC[HP#C""$&J/#I>J8B!(>2A(9"(J,C_H8
48%H,3611MM$[7`O-MN5
MC+]I$F<NVK1VVRY-
MCZR?8"F8\I:U%8&!@$A*F`VN&H;HZ9[<9!4,8
(RS-WO
MW#L@FJ2[O]_.[_>_]]SO=;YSSG>^\YBE:YQ4#
'P7)H'$2,P;+$0#?!8%,!$`
MBA`1#,`*Q"&$#W$.\3?$7UF`,3J`_T!\B.A#G
.&0C_@+XAIB`$'I`0R(*8@\
M1`%B+6(C(ML`\`)B*^*GB&.(4XC;"'H,0"SBZ
XATQ`+$$L0ZQ(N([R!>1;R.
```

Figure 1. Attachment turned into garbage

A quite separate issue from getting a file from A to B is what the recipient can do with the file once it gets there. If you sent a Microsoft Word 6.0 document to someone using Microsoft Word 5.0, the recipient won't be able to do anything with it. If you are sending a file to a group of people, you should send it in a format that they will all be able to work with. For example, not everyone has the latest release of WordPerfect for Mac. Most packages are able to save files in many formats besides their own. Figure 4 is a list of file types and some of the most readable formats you

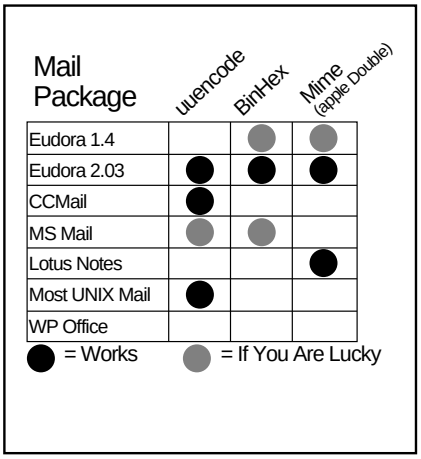

Figure 2. Mail systems and encoding schemes
```

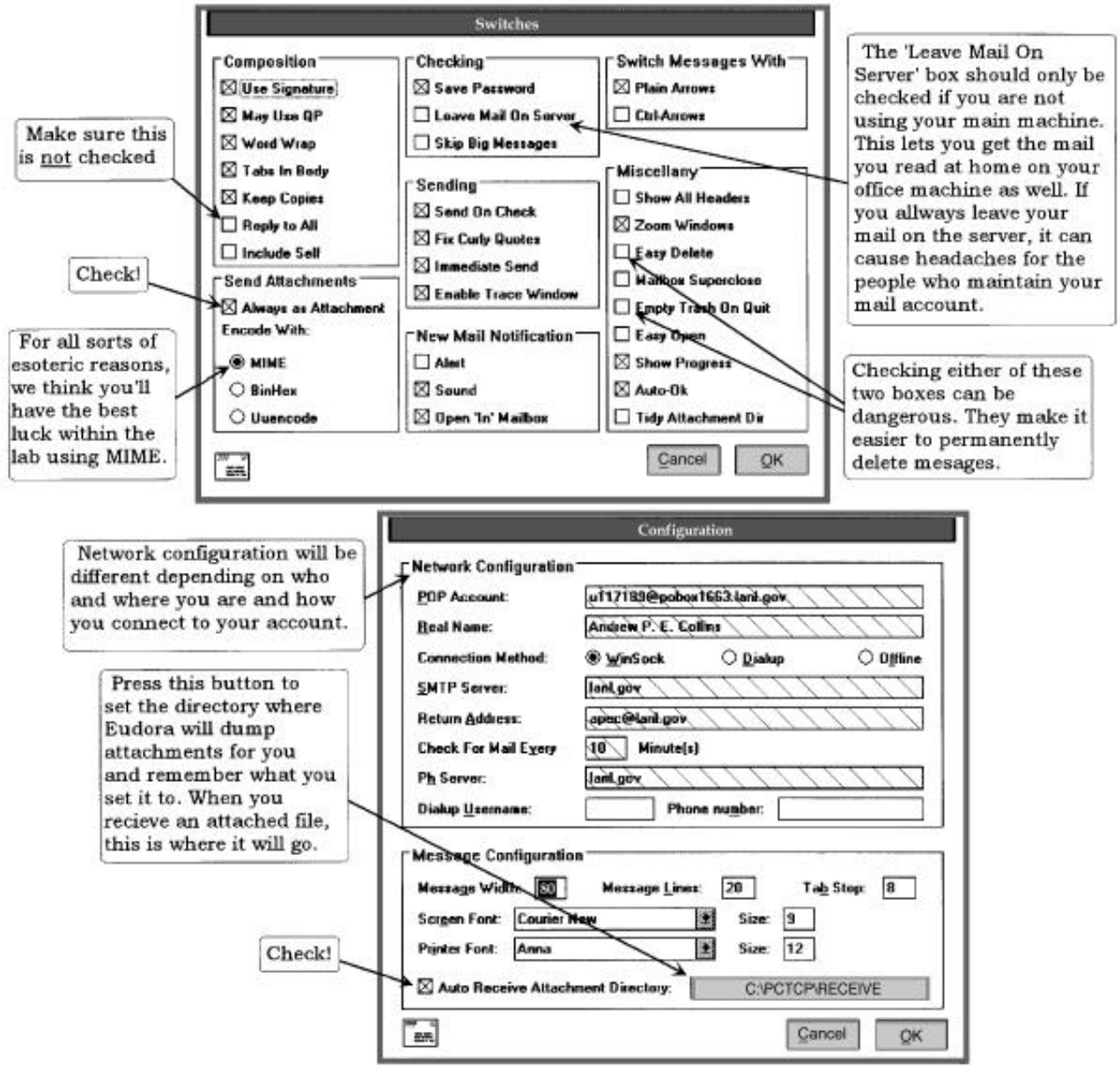

Figure 3. Recommended settings for Eudora users

can save them in. Also, compressing a file with PKZip on a PC, or Stuffit on a Mac, or compress in UNIX can really confuse someone on the other end, especially if that person is working on a different platform. You should always explain in the text of your e-mail message exactly what it is you have attached. For example, "I have attached a Word for Windows version 6.0c document sent from Eudora version 2.0.3 using Mime encoding."

So, in conclusion, to get the most out of e-mail attachments, don't send people files for a software package they can't handle, compressed in a format they can't uncompress, or encoded in a way they can't unencode. And finally, try it! It works a lot more often than you might think after reading this article.

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apec@lanl.gov
Desktop Group (CIC-2)

Spreadsheets - CSV (comma separated variable) format should always work.

Documents - ASCII text (TXT) format always works, RTF (Rich Text Format) will also work a lot of the time and preserves more of your formatting.

Bitmap graphics - GIF, BMP, and Jpeg are the most popular.

CAD drawings - DXF is the defacto standard.

Figure 4. File types and formats

Lab-Wide Systems Training

The Customer Service Group (CIC-6) offers training for users of Laboratory information systems. The CIC-6 courses offer training for a variety of personnel including property administrators, group secretaries, training coordinators, budget analysts, group leaders, or anyone needing to access training records, property records, costs, employee information, travel, chemical inventories, etc. Refer to the table below and on the following pages for specific information about courses currently offered.

Course Registration

You must have a valid "A" or "U" level ICN password before taking any of the courses shown in the table. To register for a course, call CIC-6 Training, Development, and Coordination section at 667-9444 or send e-mail to classes@lanl.gov. You will be sent a registration form to be completed and returned.

Course Title	Date	Time	Cost	Course Number
ALL-IN-ONE Basic Electronic Messaging	**3/24/95**	**8:30 - 12:00**	**$410**	**Course #6882**
	Participants receive hands-on instruction to create, read, and print electronic mail. Participants also learn how to edit mail, create distribution lists, send mail to a FAX machine, and grant mail access to others. Prerequisite: an ICN password and an account on the OFVAX.			
Automated Chemical Inventory System (ACIS):	**Scheduled Upon Request**		**$410**	**Course #7480**
	Participants receive hands-on instruction to update the status (end-user,location, quantity) of chemical containers. Participants will also learn to generate chemical inventory reports by chemical name, end-user, location, and organization.			
Budget Computing System (BUCS):	**3/20/95**	**1:30 - 5:00**	**$410**	**Course #3527**
	This training is an introduction to the Budget Computing System (BUCS). Students practice generating "quick reports" and reports requiring parameter files. An introduction and demonstration of (no "hands-on") allocating and forecasting procedures are given during the three-hour session.			
Directory Information System (DIS):	**Scheduled Upon Request**		**$410**	**Course #7072**
	Lab-wide customers responsible for maintaining the Laboratory directory in the Employee Information System will receive hands-on instruction to update Laboratory employees, update and add non-Laboratory employees, retrieve location and address information for any employee, and print reports.			
Electronic Mail Overview	**3/2/95**	**1:30 - 2:30**	**No Fee**	**Course #9757**
	This free introductory class is an overview of electronic mail at the Laboratory. In this 90-minute class, the instructor demonstrates how to create and send an electronic message using ALL-IN-1 electronic mail and Eudora electronic mail. The instructor will discuss the advantages of using electronic mail and the types of electronic mail that are supported by CIC Division. This is not a hands-on class.			
Employee Development System - Basic Training (EDS I):	**3/8/95**	**8:30 - 12:00**	**$410**	**Course #5289**
	The course provides hands-on instruction to request course enrollment, use the on-line course catalog, retrieve training transcripts, and assign EDS authorities. The student will learn to create courses, add students to the courses, and generate several training reports.			
Employee Development System - Training Plans (EDS II):	**3/22/95**	**8:30 - 12:00**	**$410**	**Course #7155**
	Participants receive hands-on instruction to create and maintain training plans, assign assignment codes, and generate training plan reports. Attendees must have prior training in the Employee Development System (course #5289).			

Course Title	Date	Time	Cost	Course Number
Eudora Electronic Mail for Macintosh Users	**3/03/95**	**8:30–12:00**	**$410**	**Course #9762**
	This class is a hands-on class that teaches the participant how to use Eudora software to create, send, receive, and edit electronic mail messages. In addition to these procedures, the participant will learn what related settings mean and how to configure the system to meet his or her individual needs.			
Facilities Project Information/Work Orders (FPI/WO):	**Scheduled Upon Request**		**$410**	**Course #6996**
	Lab-wide users with a need to view the status of work orders and tickets in their organizations will receive hands-on instruction to request, print, and review work order, ticket and project summary information reports.			
Financial Management Information System (FMIS):	**3/21/95**	**8:30 - 12:00**	**$410**	**Course #8338**
	Participants receive hands-on instruction to "explode" and "transfer" through the costs, allocations, and outstanding commitments screens. In addition, participants will create/review reports, access the Information Manager Utility for printing reports, and learn how to assign authorities in the system.			
Hazardous Materials Transfer Tracking System for Radioactive Material (HMTTS/NRAM):	**Scheduled upon request**		**$410**	**Course # 7907**
	Participants receive hands-on instruction to create, update, and print the non-RAM Hazardous Materials Transfer Form (HMTF). Attendees must have completed "Completing the HMTF for Non-RAM," course #7512, sponsored by HS-8.			
Hazardous Materials Transfer Tracking System for Radioactive Material (HMTTS/RAM):	**Scheduled Upon Request**		**$410**	**Course #7993**
	Participants receive hands-on instruction to create, update, and print the Radioactive Materials Transfer Form (RMTF). Information about the non-RAM Hazardous Materials Transfer Form (HMTF) is included. This course is appropriate for people who fill out both RAM and Non-RAM forms. Attendees must have completed "Completing the RMTF," course #7517, sponsored by HS-8.			
Introduction to Lab-Wide Systems:	**3/29/95**	**8:30 - 10:30**	**No Fee**	**Course #2900**
	This introductory class is an overview of Lab-wide information systems. During the 90 minute session, students learn how to become Lab-wide system users and access those systems. Several Lab-wide systems are demonstrated and their functions are discussed. Optional hands-on exercises are offered at the end of class.			
Lotus Notes Basic Concepts	**3/23/95**	**8:30–12:00**	**$410**	**Course #9917**
	This class provides hands-on instruction for Mac and PC users to use Lotus Notes software to create and send e-mail memos; fax documents; search databases; create filters, nicknames, banners, and doclinks; set defaults; and use multiple address books. In addition, participants learn how to use the memo, meetings, and discussion databases.			
On-Line Forms	**3/30/95**	**8:30 - 12:00**	**$410**	**Course #9756**
	Participants will learn to use Mosaic software to access Lab-wide information and forms. Using Jetform Filler software, participants will access, complete, and print forms such as the "ICN Validation Request," "Visitor Request for Unclassified Visits to Security Areas," and "Request for Quotation."			
Property Accounting, Inventory, & Reporting (PAIRS):	**Scheduled Upon Request**		**$410**	**Course #7411**
	This course is for Property Administrators (PA's) and Lab-wide customers with a need to view property record information. PA's receive hands-on instruction to update property element and location information. All participants will receive hands-on instruction to generate and print a variety of property reports. The BUS-6 Property Administrators course is recommended before PA's attend this course.			

Course Title	Date	Time	Cost	Course Number
Property Accounting, Inventory, and Reporting System (Advanced)	**3/10/95**	**8:30–12:00**	**$410**	**Course #9918**
	This course will include a refresher of PAIRS, advanced techniques and tips, explanation of the notification system, and report capabilities. Swap Shop, Loan Out information, and support tables will be discusses. Participants should already have a basic understanding of and know how to use PAIRS.			
Secretarial/Contract Services (SE):	**Scheduled Upon Request**		**$410**	**Course #7481**
	This class provides hands-on instruction for creating secretarial requests for temporary services, entering time for contract employees, and creating reports using the Information Manager Utility. The students will also learn how to review notifications and approve attendance. A training database will be used for the class.			
Signature Authority System (SAS):	**3/10/95**	**1:15 - 4:45**	**$410**	**Course #7582**
	Managers or their designees receive instruction to assign, view, and change signature authorities (purchase request, chemical purchase, and handling hazardous material). Participants will also learn how to generate and print authority reports for their organizations.			
STORES:	**Scheduled upon request**		**$410**	**Course #3529**
	Participants receive hands-on instruction to search for an item in the on-line catalog by key word, part number, or exact name. Participants learn how to select items from the catalog, and place, change and cancel an order. Several methods for reviewing orders are also taught including reviewing an order in detail, scanning all orders, and reviewing back-orders.			
Travel Reporting Information Planning System (TRIPS):	**3/22/95**	**8:30 - 12:00**	**$410**	**Course #4369**
	Class participants receive hands-on instruction to prepare travel requests (TRs) on-line and learn the print, revise, and cancel options. The participants also learn how to use the on-line approval function. The various reports available in TRIPS-II are reviewed.			

CIC Computing Classes

CIC offers a variety of computing courses for the professional development of Laboratory employees. The courses listed in Table 1 will meet at the time and the date shown. Time and date for the courses in Table 2 are not known at this time.

Course Registration

To register: (1) check the box beside the appropriate course, (2) complete the Enrollment Information section located on the back of this form, and (3) follow the mailing instructions also on the back of this form. Submittal of a Course Registration form does not guarantee participation in an advertised class, but it is the only way to get into the queue for notification of upcoming classes. Classes are conducted in a secure area unless noted; uncleared participants require escorts. Call the Training Coordinator at 667-9399 for more information.

Table 1 Courses with confirmed time and date

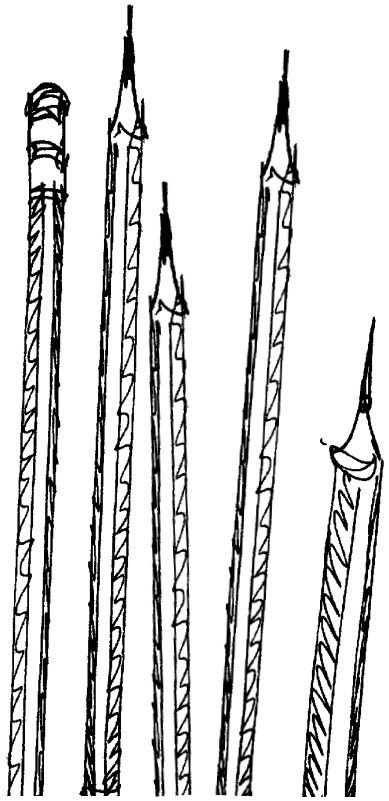
	Course Title	Instructor	Cost	Dates/Time
☐	C Programming (Advanced)	Michael Chase	$1000-$1400	4/10/95 through 4/14/95
☐	Solaris 1.X Advanced System Adminstration	John Nouveaux, SMI	$1500-$1800	3/27/95 through 3/31/95
☐	Solaris 2.X Network Admin. (Advanced)	John Nouveaux, SMI	$1500-$1800	4/17/95 through 4/21/95
☐	UNIX (Beginning)	Ted Spitzmiller & Jeffrey Johnson	$810	3/13/95 through 3/17/95

Table 2 Courses with time and date to be arranged (TBA)

	Course Title	Instructor	Cost	Dates/Time
☐	C Programming (Beginning)	Marilyn Nelson	$1000-$1400	TBA

Note: Detailed course descriptions are provided on the following pages.

cut along dashed line



Name _____

Phone _____ Z-Number _____

Group _____ Mail Stop _____

Program Code* _____ Cost Code* _____

Group Leader Signature _____

Enter program code and cost code for all courses. If you need to withdraw from a class fewer than 5 working days before the class is scheduled to begin, your group will still be charged. Substitutes may be sent, but please let the CIC Division Training, Development, and Coordination Office (667-9399) know who your substitute will be.

Do Not Staple
Fold on This Line First

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL

FIRST CLASS MAIL PERMIT NO. 88 LOS ALAMOS NM

POSTAGE WILL BE PAID BY ADDRESSEE

CUSTOMER SERVICE GROUP (CIC-6)
CIC DIVISION TRAINING, DEVELOPMENT, & COORDINATION TEAM
MAIL STOP B296
LOS ALAMOS NATIONAL LABORATORY
P.O. Box 1663
LOS ALAMOS, NEW MEXICO 87544-9916

Do Not Staple, Seal with Tape
Fold Here

C Programming (Beginning)

Location: CIC-Division Classroom, TA-3, SM-200, Room 210 (secure area).

Prerequisite: An understanding of and useful skills in a high-level programming language. A current ICN password is required.

Enrollment: Minimum 10/Maximum 16.

Topics: Introduction and Fundamentals; Basic Semantic Constructs—Getting Started; Base Level I/O With C; The Preprocess-Compilation Environment; Operators, Data Types, and Storage Classes; Control Flow Constructs; Conditional Constructs; Higher-Level Data Constructs in C; File I/O; UNIX Software Tools and POSIX System Calls.

C Programming (Advanced)

Location: C-Division Classroom, TA-3, SM-200, Room 210 (secure area).

Prerequisite(s): Useful skills and experience with the C Programming language.

Enrollment: Minimum 10/Maximum 16.

Topics: Data Structures, Algorithms, and OOP; An Advanced Clinic for C Programmers; The ANSI C Recommendation X3.159; C and ANSI C War Stories; The Data Structure and the Assessment of Algorithms; Arrays; Structures; Unions; Stacks; Queues; Linked Lists; Recursive Functions; Binary Trees; Hashing; File Organizations Using the C Runtime Library; Standard Interprocess Communication Mechanisms; An Introduction and Overview of AT&T's C++ 3.0; Appendix: references for periodicals, journals, and texts.

Solaris 1.X Advanced System Administration

Location: CIC-Division Classroom, TA-3, SM-200, Room 210 (secure area).

Prerequisite: Solaris 1.X System Administration or equivalent experience.

Enrollment: Minimum 10/Maximum 12.

Topics: TCP/IP networking model's major protocols; Monitoring network traffic; Monitoring/controlling Address Resolution Protocol (ARP) cache; Setting up/configuring/managing a Sun router and subnets; Pros and cons of TCP versus User Datagram Protocol (UDP); Configuring/maintaining Remote Procedure Call (RPC)/based files and applications; Managing client-server communications; Analyzing network configurations for performance tuning; Assessing disk loads for improved I/O throughput; Modifying file system parameters for increased disk space utilization and performance; Analyzing Virtual Memory, paging, swapping, RAM and swap space usage; Evaluating NFS statistics and reconfiguring for increased performance; Tuning kernel parameters to optimize buffer cache usage; Creating and adding a custom NIS map to an existing domain; Setting up and maintaining a DNS domain.

Solaris 2.X Network Administration (Advanced)

Location: CIC-Division Secure Classroom (TA-3, SM-200, Room 210).

Prerequisite: Solaris 2.X System Administration or equivalent skill.

Enrollment: Minimum 10/Maximum 12.

Topics: Analyzing and tuning your network configuration for optimal performance; Installing an Internet network router and enabling subnetting; Identifying and using network troubleshooting tools; Installing UUCP between existing Solaris 2.X networks; Configuring sendmail and using advanced name service features; Using network application tools for system installation and configuration.

UNIX (Beginning)

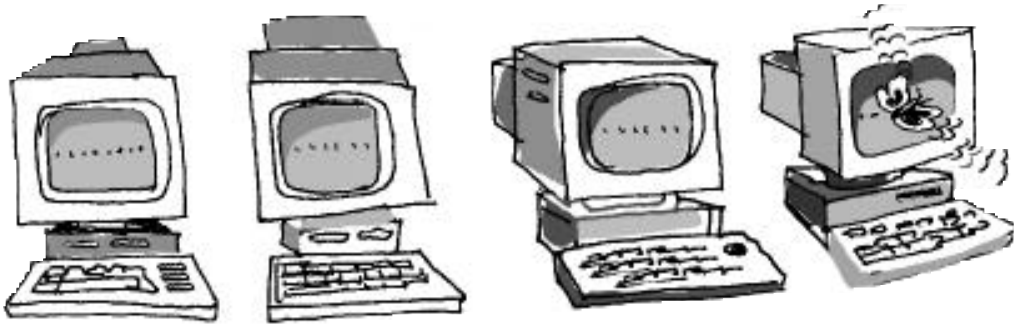
Beginning UNIX—This course has been restructured to address generic UNIX information. There is no longer a focus on Sun operating systems and tools. Additional topics are being added. This course will probably be offered on a quarterly basis.

Location: CIC-Division Classroom, TA-3, SM-200, Room 210 (secure area).

Prerequisite: Familiarity with a UNIX workstation.

Enrollment: Minimum 8/Maximum 10.

Topics: Overview of the Workstation environment; Getting Started; The UNIX File System; Manipulating Files; Customizing Your Environment; The C-Shell; Editing and Writing with vi; Using the Network; Discussing NFS and NIS; Using basic system status commands; Startup and shutdown procedures; Using tar.



ICNchanges Contents

Change Control for March 1995

Schedule for Change Control

Date	Activity
March 7 (First Tuesday)	New or changed software is available in experimental (**X**) files on CFS for testing. This initial testing period is for uncovering problems in the software before the software is put into production. If you find a problem, please call the ICN Consulting Office at (505) 667-5745.
March 14 (Second Tuesday)	The changes become production version on • Machine **rho** (UNICOS) • Distributed processor **beta** (ULTRIX) • Distributed processor **ccvax** (VMS)
March 21 (Third Tuesday)	If no problems are reported to the ICN Consulting Office (505) 667-5745, changes are installed on • Machine **gamma** (UNICOS)
STOP	The Department of Energy (DoE) has frozen software changes to the machines in the secure network. **X** Files and executables will be placed on CFS as usual. Users are encouraged to test the **X** Files. Executables will be installed in a staggered fashion when the freeze is lifted- a currently unknown date. • Machines **delta**, **epsilon**, and **zeta**

Note: A stop sign in front of a title is significant:

STOP **= incompatible changes; please read!**

Changes

CFTLIB (UNICOS)

Function

Fortran run-time extension library providing capabilities not found in standard UNICOS libraries.

Change

The following changes have been installed:

- Subroutines SETALRM and SETTL were rewritten for UNICOS Version 8.0.
- Subroutine GETHZ was added to the library to centralize the obtaining of the current machine's clock cycle. The following routines were modified to use this new routine:

  GETHTR, QSTART, QTIME, TIMING, and TIMESF

- Routines CLOSEP, CLOSEPS, OPENP, OPENPS were fixed to handle unformatted files properly.

X File Access

On CFS as: **/ccx/unicos/lib7/libcftlib.a** for Machine Rho.
On CFS as: **/ccx/unicos/lib7c/libcftlib.a** for Machine Gamma.
On CFS as: **/ccxs/unicos/lib7/libcftlib.a** for Machines Delta and Epsilon.
On CFS as: **/ccxs/unicos/lib8/libcftlib.a** for Machine Zeta.

Online Documentation

To display the man page (dated 2/95), enter: **man cftlib**

This overview man page includes a functional summary of all routines in the library.

To display the man pages for a specific routine, enter: **man** *routine_name*

Printed Documentation

The new CFTLIB on UNICOS Reference Manual is available in Standard Text format on CFS in **/icndoc/ascii/scftlib.unicos**.

This 370-page document is designed to be printed through PAGES as follows:

```
cfs get /icndoc/ascii/scftlib.unicos
ntext scftlib.unicos cftlib.manual
ppages -ft txt cftlib.manual
```

COST (UNICOS)

Function

Produces a monthly or yearly summary of CCF charges for a specific user, group, program, division, or charge code.

Change

COST did not quite keep up with the Laboratory reorganization. The "numerical" designations for divisions EES, LS, M, NMT, P and T had retained their old values. These have been corrected to the proper current values of 8g, 8c, 8n, 8j, 8k, and 8e, respectively. This would have affected runs in which the symbolic forms (EES or EES-1) were used, but not runs in which the "numerical" forms (8g or 8g01) were used.

X File Access

On CFS as: **/ccx/unicos/bin7/costx** for Machine Rho.
On CFS as: **/ccx/unicos/bin7c/costx** for Machine Gamma.
On CFS as: **/ccxs/unicos/bin7/costx** for Machines Delta and Epsilon.
On CFS as: **/ccxs/unicos/bin8/costx** for Machine Zeta.

Online documentation

To display the man page (dated 10/93) enter: **man cost**

To display the built-in help package, enter: **cost -h**

PPAGES (HP, IBM, IRIS, NEXT, SOLARIS, SUN, ULTRIX, UNICOS)

Function

Submits jobs to the Print and Graphics Express Station (PAGES) for paper or film output.

Change

The metafile header that carries information about printing preferences has been changed. The new header will have a version number 2.0 and will allow up to 999 files to be concatenated together (the old metafile only allowed 99). The old header will still be allowed to print through pages and no user visible differences will be noticed. The following new option will be added to **ppages**:

-hc *color* — Where color is either **r** for red, **g** for green, or **b** for blue. For all except text files, paper output will be printed with the highlight color specified if the color information is in the file. This applies to 8.5-by-11-inch paper output only.

X File Access

On CFS as: **/ccx/unicos/bin7/ppagesx** for Machine Rho.
On CFS as: **/ccx/unicos/bin7c/ppagesx** for Machine Gamma.
On CFS as: **/ccxs/unicos/bin7/ppagesx** for Machines Delta and Epsilon.
On CFS as: **/ccxs/unicos/bin8/ppagesx** for Machine Zeta.
On CFS as: **/ccx/ultrix/ppagex.tar** for ULTRIX Machine Beta.
On CFS as: **/ccx/hp/ppages.tar** for HP workstations.
On CFS as: **/ccx/ibm_rs6000/ppages.ta**r for IBM RS-6000 workstations.
On CFS as: **/ccx/sgi/ppages.tar** for IRIS workstations.
On CFS as: **/ccx/next/ppages.tar** for NeXT workstations.
On CFS as: **/ccx/sun/ppages.tar** for Sun/SunOS workstations.
On CFS as: **/ccx/solaris/ppages.tar** for Sun/Solaris workstations.

Online Documentation

To display the man page (dated 3/95), enter: **man ppages**

WHATLIB (UNICOS)

Function

Searches a certain data file for the name(s) of libraries with which one or more entry point or common block name is associated.

Change

WHATLIB itself has not changed, but the data file it searches (**/usr/local/data/nilibs**) has been updated to reflect recent changes in the local **cgs** and **cftlib** libraries, and in the Cray libraries **libm.a** and **libsci.a**.

X File Access

No experimental (**X**) files.
New version available as per the Change Control Schedule.

Online Documentation

To display the man page (dated 5/94), enter: **man whatlib**

Network Services Information

This section provides information and a record of changes to the software and hardware that make up the ICN network and the services it provides. If you detect a problem, please call the ICN Consulting Office at (505) 667-5745, or send electronic mail to **consult@lanl.gov**.

STOP LANL World Wide Web Server

The main LANL World Wide Web Server, **www.lanl.gov**, service is moving to a new platform and will be changing significantly in appearance and organization over the next few months. The changes will be noted on the LANL Home page; **http://www.lanl.gov/** as they become known.

System Information

This section provides information and a record of changes to the ICN operating systems. When changes are announced here, they may already be included in the production versions of the indicated operating systems and machines. Most of the changes are strictly internal to the systems and should not affect users. However, if you detect a problem, please call the ICN Consulting Office at (505) 667-5745, or send electronic mail to **consult@lanl.gov.**

UNICOS Version 8.0

Function

Operating System.

Change

UNICOS Version 8.0 is quite a bit different from our other UNICOS systems, which required us to rewrite the purge operation for **/tmp** and **/usr/tmp**. The rewrite changed the purge process slightly; symbolic links will be purged.

Currently this change only affects Machine Zeta. Tau, although running UNICOS Version 8.0, does not purge **/tmp** and **/usr/tmp** at this time. There are no scheduled plans to upgrade the other Cray machines to UNICOS Version 8.0, but we anticipate doing this in late spring or summer of 1995. We are publishing this article now so that you will have a few month's warning.

The **/usr/tmp** purge operation will delete symbolic links based on the following rules.

1. The directory has not been modified within 30 days, and would be empty except for symbolic links.
2. These symbolic links have not been accessed within 30 days.

If these two conditions are met, the directory and the symbolic links are deleted together. The same is true for the purge of the **/tmp** file system, except that the grace period is 2 days rather than 30 days.

For more information please see the article "UNICOS 8.0: Modifications to Purge Process" in the Feature Articles section of this issue of *BITS*.

Third-Party Software

This section provides information and a record of changes to software that is obtained from third party vendors and is made available on ULTRIX, UNICOS, or UNIX systems in the ICN. This software is not supported by C Division but rather by an individual referred to as the maintainer. A current list of third party software and its maintainers is in a SUPPORT man page that you can view on UNICOS systems by entering:

man support

Please be aware that it is optional for the software maintainers to provide information about changes here and that the level of support might be minimal. The ICN Consulting Office will act as a liaison between users and vendors only for software that does not have a maintainer listed on the man page. If you detect a problem, please contact the software's maintainer at the telephone number or the electronic mail address that are given here or in the man page.

Programs, data, and libraries are located in the following directories, respectively. You might want to include them in the variable for your search path.

/usr/local/ubin **/usr/local/udata** **/usr/local/ulib** **/usr/local/usys/***utility*

NetCDF (UNICOS)

Function

The University Corporation for Atmospheric Research (UCAR) Library for Self-Describing Data Files.

Change

This is a new third party library being added to the local UNICOS environment. NetCDF is a library of I/O routines that create portable, self-describing data files. Each file contains meta-data at the front, detailing the contents of the file. The file is written through the standard XDR library making the resultant data file very portable.

X File Access

On CFS as: **/ccx/unicos/ulib/netcdf** for all UNICOS machines.
Will be available as per Change Control Schedule at **/usr/local/ulib/netcdf**

Online Documentation

To display the man page (dated 3/95), enter: **man netcdf**

The man page details how to obtain the *NetCDF User's Guide*, along with local extensions to the library. Available on all Open UNICOS Machines.

Documentation

New and Updated Man Pages

The following online information has been added or updated.

UNICOS Man Pages

To access a UNICOS man page, enter: **man** *command_name*, where *command_name* is the name of the command, library, routine, or utility whose man page you wish to view.

Man Page	Description
cftlib	CFTLIB on UNICOS is a collection of routines designed to aid the Fortran programmer by providing extensions to the capabilities provided by the standard UNICOS library environment.
netcdf	NetCDF is a library of I/O routines that create portable, self-describing data files. Each file contains meta-data at the front detailing the contents of the file, and the file is written through the standard XDR library making the resultant data file very portable.
ppages	This utility accepts input parameters, then sends files through the network to PAGES for processing. On ULTRIX and Sun UNIX systems, if no filename is given, or if the filename argument '-' is given, **ppages** reads from the standard input.

To create ASCII files of the UNICOS man pages, use the following command to remove the special characters for bold and underlining:

UNICOS 7.0 and 8.0: **man** *command_name* **| col -bx >** *filename*

Barbara Ritchie (**bxr@lanl.gov)**, (505) 667-7275
Communication Arts and Services (CIC-1)

Information About Change Control

ICN Change Control is the set of procedures that coordinates changes in the ICN to ensure quality control and smooth operation and to avoid introducing additional problems. In an environment as dynamic as the ICN, control must be imposed on the scope and timing of changes that involve many components. Please report any problems as soon as they occur by calling the ICN Consulting Office at (505) 667-5745.

The following CFS nodes are used for software that is maintained or announced through Change Control procedures. The files under **/ccx(s)/unicos** are deleted the last Friday of each month because these experimental versions become the production versions on all machines by the third Tuesday of the month. The other nodes keep the most recent versions of their respective software.

Open Network

Non UNICOS	**/ccx/***platform*/filename*
UNICOS	**/ccx/unicos/***type**/filename*
	examples: **/ccx/mac/ppages**
	/ccx/unicos/bin7/ppagesx
	/ccx/unicos/ubin7c/tedix
	/ccx/vax/ppages.bak

Secure Network

UNICOS	**/ccxs/unicos/***type**/filename*
	example: **/ccxs/unicos/lib8/libcftlib.a**

*Where *platform* is:

alpha_osf	tar files for DEC Alpha OSF/1 machines.
alpha_vms	backup save sets for DEC Alpha VMS machines.
convex	tar files for Convex machines.
dec_risc	tar files for DEC RISC workstations.
dos	executables for PC/DOS machines.
hp	tar files for Hewlett-Packard workstations.
ibm_rs6000	tar files for IBM RS6000 workstations.
mac	binhex (**.hqx**) or MacBinary (**.mbin**) files for Macintosh computers.
next	tar files for NeXT workstations.
sgi	tar files for Silicon Graphics workstations.
solaris	tar files for Sun Solaris workstations.
sun	tar files for Sun workstation.
ultrix	current executables to test on Beta.
unicos	executable **X** files for current Change Control cycle.
vax	backup-save-sets for VAX/VMS systems.

**Where *type* is:

bin	binary file.
lib	library.
#	operating system (OS) version.
u	user-supported.

If problems are discovered during the cycle, defective hardware or software is corrected, replaced, removed, or backed off.

Online Information

You can access complete online information about Change Control by using the Internet Gopher Server. For more information on how to connect to the Gopher Server, see the article "Internet Gopher Delivers Information" in the Feature Articles section of the September 1993 News. You may also contact the Customer Service Center at (505) 665-4444 or e-mail **cichelp@lanl.gov**.

After you connect to the Gopher Server you will see a menu of options. Select the following series of options from the **gopher** menu:

- Computing at LANL
  You will get a new menu.
- BITS: ICNchanges
  You will get a new menu. Select the next menu that reflects your needs.
  - Keyword Search of all ICNchanges (?)
  - Current (*month year*)
  - 1994 Archives
  - 1993 Archives
  - 1992 Archives
  - 1991 Archives
  - 1990 Archives
- Select "Current (*month_year*)"
  to get a list of the articles for the current month's Change Control.
  You will get a new menu. Select the next menu that reflects your needs.

  BITS: ICNchanges - ASCII Version

  BITS: ICNchanges - Acrobat Version

  BITS: ICNchanges - PostScript Version

*Barbara Ritchie (**bxr@lanl.gov**), (505) 667-7275*
Communication Arts and Services (CIC-1)

APRIL DEADLINE

The deadline for articles for the April 1995 Change Control is 8:00 am. Friday, March 17, 1995. Please submit items to **bulletin@lanl.gov.**

CCF Machine Availability and Downtime

Machine Name(s)	Machine Type	Operating System	Security Partition	System Availability (Dec. 1994)	Scheduled Downtime*
delta	CRAY Y-MP8/8-128	UNICOS 7.0	Secure	99.5%	March 15 — 0400-0700
epsilon	CRAY Y-MP8/8-128	UNICOS 7.0	Secure	99.5%	March 1, 29 — 0400-0700
rho	CRAY Y-MP8/8-64	UNICOS 7.0	Open	99.6%	March 1, 29 — 0400-0700
zeta	CRAY Y-MP8/2-64	UNICOS 8.0	Secure	99.7%	March 8 — 0400-0700
gamma	CRAY Y-MP/M98-82048	UNICOS 7c	Open	99.7%	March 8 — 0400-0700
tau**	CRAY T3D MC256-16	MAX 1.2	Secure	100%	March 15 — 0400-0700
	CRAY Y-MP4I/464-2	UNICOS 8.0			
pi**	CRAY Y-MP EL92/1-256	UNICOS 8.0	Open	100%	
cluster	IBM Workstation Cluster	AIX	Open		
beta	VAX 6320	ULTRIX	Open		
CCVAX	VAX 6410	VMS	Open		
OFVAX	VAX 6410	VMS	Open		
canyon	Thinking Machines Corp. CM-200	SunOS	Secure		
tres	Thinking Machines Corp. CM-200	SunOS	Secure		

* Additional downtime for the Cray machines may occur as a result of Network Dedicated Systems Time (NDST). The schedule for possible NDST is from 0600-0700 Mountain Time, Monday through Friday. Should NDST become necessary, a message listing the scheduled downtime will be broadcast on the applicable machines before the actual downtime occurs. For additional information contact the shift supervisor at (505) 667-4584. All times listed are Mountain Time.

** Access restricted.

Questions About Announced Changes?

Notice of all scheduled downtime will be broadcast on the machine before the downtime. For up-to-date machine status and scheduled downtime call: CCF Status Message (505) 667-5588.

Publication Information

ICNchanges Editor/Publication Coordinator
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Mail Stop B295
Telephone (505) 667-7275

Change Control Coordinator
Marjorie Johnston (CIC-6)
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Advanced Computing Laboratory

When first founded, the Advanced Computing Laboratory (ACL) was intended to provide an applications-driven environment for developing leading edge computing technologies, primarily in the areas of parallel and distributed computing, scientific visualization, and high-speed networking.

In December 1991, Los Alamos National Laboratory was named as one of two national HPCRC (High-Performance Computing Research Center) sites by the Department of Energy's HPCC (high-performance computing and communications) program. The ACL is the foundation upon which this center is being built. The mission of the ACL is to facilitate solution of tomorrow's complex, interdisciplinary problems in science, industry, and defense. This will be accomplished by focusing on a few Grand Challenge-scale applications, providing a unique simulation environment and advanced computational resources, having a world-class staff, and forging links with other centers of excellence.

The resources of the ACL are available to LANL employees with a demonstrated need for the unique resources that the ACL provides. In addition, industrial collaborators may seek access through a partnership with the Laboratory, which can be arranged through the Computational Testbed for Industry (CTI). Under the auspices of the DOE Grand Challenge program, other external researchers involved in the LANL-based Grand Challenge projects may also seek access. An ACL account application form is available by sending e-mail to **proposal@acl.lanl.gov.** The only payment the ACL requests for use of its resources is a copy of any paper or other publication with ACL acknowledgment in the publication.

ACL Machine Availability

Machine Type	Operating System	Security Partition	Machine Name(s)
FPS350X (Stardent GS2000)	STELLIX	Open	stella
FPS500	FPX	Open	blanche
ibm930	AIX	Open	ibm930
Intel iWARP	SunOS	Open	iwarp
Motorola Monsoon	SVR2	Open	monsoon
SGI ONYX	SVR3	Open	black
SGI 380VGX	SVR3	Open	panda
IBM 550	AIX	Open	noid
Thinking Machines Corp. Connection Machine CM-5*	SunOS	Open	cm5-1 to cm5-8
CRI T3D*	UNICOS 80	Open	T3D
Sun 4/670	SunOS	Open	koala
Sun 4/670	SunOS	Open	cocker
Sun 4/670	SunOS	Open	collie
Sun 4/670	SunOS	Open	pooh

* Special access rules apply.

Accessing Computing Machines through the ICN

This table shows how to access open machines on the ICN through MICOM lines, TCP/IP hosts, and DECnet hosts. Additional machines outside the ICN are accessible through TCP/IP and DECnet. To access any of these machines, except for LIS, you must first establish an ICN account, which includes obtaining an ICN password and registering as an ICN user (contact the CIC Customer Service Center for details).

Example: Suppose you want to access the REGISTER machine from MICOM. By referring to the table, you can see that the appropriate command to enter is tig. Once you connect to the tig, enter your ICN usernumber and password as prompted. At the tig prompt (tig>) enter register and login to the register machine.

TO → / FROM ↓	Hosts reachable from MICOM Lines:(BETA, CCVAX, IOVAX, OFVAX, STORES, TYMNET, LIS)	TCP/IP Hosts: (BETA, CCVAX, IBM Cluster IOVAX, OFVAX, REGISTER, UNICOS, ACL Hosts, etc.)	DECnet Hosts: (BETA, CCVAX, IOVAX, OFVAX, etc.)
MICOM Lines	hostname	TIG TELNET hostname	TIG TELNET DIG SET HOST hostname
TCP/IP Hosts (e.g., TIG)	TELNET MICOM hostname	TELNET hostname	TELNET DIG SET HOST hostname or, from BETA DLOGIN hostname
DECnet Hosts	SET HOST DIG TELNET MICOM hostname	SET HOST DIG TELNET hostname	SET HOST hostname

Accessing the ICN through Dialup Modem

Dialup access to the ICN is available through the Terminal Internet Gateway (tig). The tig is a gateway to the internet and allows you to telnet to ICN machines as well as other machines. Configure your modem and terminal for 8 bit, no parity, one stop bit. Based on your modem, select the appropriate number listed in the table to dial into the tig. Then enter your ICN usernumber and password as prompted. At the tig prompt (tig>) enter a machine name or IP address.

Report problems to the Network Control Center at 667-7423 Monday through Friday, 6 am to 6 pm or at 667-4585 during non-business hours.

Type of Access	Phone Numbers
Microcom Modems from 300 to 28,000 b/s	(505) 667-9020, 9021 (Number of Lines 16)
Microcom Modems from 300 to 14,400 b/s	(505) 667-9022, 9023, 9024, and 9025 (Number of Lines 48) (800) 443-1461 (Number of Lines 10)
Note: Use the second phone number if the first does not answer properly.	
	Revised December 1994

Macintosh Software Order Form **DSC Software Order Form**

To order free software, fill in the blanks below, check the software you would like to have, and mail this form to

Free Software
Desktop Support Center (CIC-2) MS D445

Name _____ Group _____
Mail Stop _____ Z-Number _____
Cost Code _____ Program Code _____ Account Package _____

Please send the correct number of replacement high-density diskettes with your request. This software can also be retrieved via FTP from *ftp.lanl.gov.* (You will need to log on with your Z-Number and ICN password to access the LANL-only software.)

_____ **FREEWARE DISKETTE** (Include one high-density diskette.)
This diskette contains the following software:

Alias Finder: Quickly finds the original of an alias when the alias is dragged on top of the Alias Finder icon.
Disinfectant: Virus protection for the Macintosh.
Disk Copy: Creates copies of diskettes using one floppy drive.
SCSI Probe: Shows connected devices on the SCSI bus.
StuffIt Expander: Unstuffs BinHex 4.0, StufIt, and other types of compressed files.

Note: The following two applications come with System 7.5:

Extensions Manager: Allows selection of which INITs to load.
SuperClock: Puts a clock in the upper right corner of your Macintosh.

_____ **INTERNET DISKETTE** (Include one high-density diskette.)
This diskette contains the following software:

Fetch: Easy-to-use for FTPing files from FTP archives.
NCSA Telnet: Telnet application
TurboGopher: Gopher client application for the Macintosh.
StuffIt Expander: Unstuffs BinHex 4.0 and other types of compressed files.

_____**MACINTOSH SYSTEM 7.5** (Include nine high-density diskettes.)
Indicate number of systems on which this System 7.5 will be used:_____

SYSTEM 7.5 POWERTALK AND QUICKDRAW GX. (Include four high-density diskettes.)
Note: We recommend that you do not install these parts of System 7.5 unless you have a specific need to do so.

Note: Manuals available for $7.50, set of diskettes available for $10.00. Enter your accounting information above. CD-ROM version available for free loan. Call 5-1361 for details.

_____ **NETSCAPE** (Include one high-density diskette.)
Netscape is a commercial web browser. Even though it is available on the Internet, it is not free. CIC-2 has bought 1,000 copies of Netscape for a cost of $30.00 per copy. Enter your accounting information above. We will include a license certificate indicating your purchase. If you do not need a diskette copy of Netscape, check below.

____Do not need a diskette. I already have a copy and just need the license.

_____ **ACROBAT READER** (Include one high-density diskette.)
Multi-platform document viewer. Used with viewing "pdf" documents on the LANL web server and fast becoming an Internet standard.

_____ **ACROBAT EXCHANGE** (Include four high-density diskettes.)
An enhanced version of the Acrobat Reader. Allows you to create and annotate "pdf" files as well as read them. Note: CIC Division bought a license of 1,000 copies of Acrobat Exchange. We do not charge for this software but can only distribute 1,000 copies of it (both Mac and PC).
Indicate the number of systems on which this copy of Acrobat Exchange will be used:____

CUT ALONG DASHED LINE

IBM Software Order Form **DSC Software Order Form**

To order free software, fill in the blanks below, check the software you would like to have, and mail this form to

Free Software
Desktop Support Center (CIC-2) MS D445

Name _____Group _____
Mail Stop _____ Z-Number _____
Cost Code _____ Program Code _____ Account Package _____

Please send the correct number of replacement high-density diskettes with your request. This software can also be retrieved via FTP from *ftp.lanl.gov*. (You will need to log on with your Z-Number and ICN password to access the LANL-only software.)

_____ **DATA PHYSICIAN** Virus detection programs. (Include one high-density diskette.)

_____ **INTERNET DISKETTE** (Include one high-density diskette.)

lview31	A gif/bmp/pic viewer.
tsyncl>8	Set up your pc clock via LANL ntp timeserver automatically.
WS_Ftp	Super ftp client.
WS_Ping	Super ping and nslookup.
pkunzip	File decompression program.

_____ **NETSCAPE** (Include one high-density diskette.)
Netscape is a commercial web browser. Even though it is available on the Internet, it is not free. CIC-2 has bought 1,000 copies of Netscape for a cost of $30.00 per copy. Enter your accounting information above. We will include a license certificate indicating your purchase. If you do not need a diskette copy of Netscape, check below.
___ Do not need a diskette. I already have a copy and just need the license.

_____ **ACROBAT READER** (Include one high-density diskette.)
Multi-platform document viewer. Used with viewing "pdf" documents on the LANL web server and fast becoming an Internet standard.

_____ **ACROBAT EXCHANGE** (Include four high-density diskettes.)
An enhanced version of the Acrobat Reader. Allows you to create and annotate "pdf" files as well as read them. Note: CIC Division bought a license of 1,000 copies of Acrobat Exchange. We do not charge for this software but can only distribute 1,000 copies of it (both Mac and PC). Indicate the number of systems on which this copy of Acrobat Exchange will be used:___

_____ **JETFORM FILLER** (Include five high-density diskettes.)
Form-based document software for use with the LANL's web server on-line forms. Note: CIC-13 bought a license of 2,000 copies of Jetform Filler. We do not charge for this software but can only distribute 2,000 copies of it (Mac version available soon).
Indicate the number of systems on which this copy of Jetform Filler will be used:___

CUT ALONG DASHED LINE

Los Alamos
National Laboratory

INTEGRATED COMPUTING NETWORK (ICN) VALIDATION REQUEST

To access ICN Computing resources, please complete all parts of this form that apply to you, including "Special Requirements."

If you have **questions**: Call: (505) 665-1805
E-mail: validate@lanl.gov

Mail your completed application to:
ICN Password Office (PWO)
Mail Stop: B271
Los Alamos National Laboratory
Los Alamos, NM 87545

All Laboratory computers, computing systems, and their associated communication systems are for official business only. By completing this request, users agree not to misuse the ICN. The Laboratory has the responsibility and authority to perodically audit user files.

Owner Information

Z-Number (if you have one)	PWO Use Only	Name (last, first, middle initial)
LANL Group	LANL Mail Stop	Citizenship (Foreign National see "Special Requirements-Foreign National")
Phone Number	Cost Center	Program Code

Check LANL affiliation:

- ☐ LANL employee
- ☐ Contractor _____ (specify contract company)
- ☐ Consultant, VSM, associate
- ☐ External user_____ (specify employer)
- ☐ Other (specify)_____

Send password / smartcard to:

☐ Mail Stop or ☐ Mail to address indicated below

Name / Organization
Address
City, State, Zip Code

Access Check access method and needed partitions.

Access method: ☐ ICN Password ☐ Smartcard ☐ Both

☐ **Open** partition (e.g., email systems, open machines)

☐ **Administrative** partition (e.g., IA [BUCS, Stores, Travel], IB [EIS, FMIS, PAIRS])

If you are not a Q-cleared LANL employee, see required steps in section "Special Requirements-Administrative Partition.

☐ **Secure** partition (i.e., secure machines)
Indicate level(s) of data to be processed:
- ☐ Unclassified
- ☐ Secret

I certify this person does require secure access:

Manager Signature (Group Leader or above) Date

NOTE: A Q-clearance is required. All classified computing must be performed within the Secure environment.

PWO Use Only

New ☐ Change ☐	Clearance Status	Processed	Lv	Smartcard Serial #
Comments:				

Form 1646 (11/94) Supersedes previous versions (rev. 11/08).

Continue

Special Requirements

Administrative Partition
(U.S. Citizens Only) — Lab-Wide Systems (e.g., IA [BUCS, Stores, Travel], IB [EIS, FMIS, PAIRS])

☐ Under 18 years of age

If you need to access Administrative systems, your group leader must provide a memo accepting responsibility for your actions and justifying your need for access. This memo is to accompany all forms taken to the security briefing (see "Contractor or Non-Q-Cleared") section below. You may not access the Secure Partition.

☐ Contractor or Non-Q-Cleared

Phone (505) 667-9444 to obtain Access Authorization packet.

Phone (505) 667-9153 to schedule a security briefing.

Bring all forms including this ICN Validation Request to the security briefing for approval.

Security Briefing Approval Signature	Date

☐ Foreign National

Attach a copy of Form 982 (REQUEST FOR UNCLASSIFIED VISIT OR ASSIGNMENT BY A FOREIGN NATIONAL) with all approval signatures. Be sure Box #11 of Form 982 is completed. If you are not a visitor/assignee under a LANL/DOE approved Visit / Assignment Request, attach written justification from your host Division Director describing your need to access the ICN.

Authorization (required)

Print Manager Name (Group Leader or above)	Manager Z-Number	Group
Manager Signature (Group Leader or above)	Mail Stop	Date

If you are NOT a LANL employee, obtain your LANL contact's signature in addition to the contact's manager's signature.
NOTE: LANL contacts are regular Laboratory employees. Contacts are responsible for obtaining annual re-authorizations, forwarding renewals, and notifying the ICN Password Office of changes in user or contact status.

Print LANL Contact Name	Contact Z-Number	Phone Number	Group
LANL Contact Signature		Mail Stop	Date

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